

# PUBLIC ROADS

A JOURNAL OF HIGHWAY RESEARCH



UNITED STATES DEPARTMENT OF AGRICULTURE  
BUREAU OF PUBLIC ROADS



VOL. 18, NO. 6

TRANSPORTATION LIBRARY

AUGUST 1937



THE BROAD HIGHWAY BECKONS TO MOTOR VAGABONDS

For sale by the Superintendent of Documents, Washington, D. C.

See page 2 of cover for prices

UNIVERSITY OF MICHIGAN LIBRARIES

---

---

# PUBLIC ROADS

▶▶▶ *A Journal of  
Highway Research*

*Issued by the*

UNITED STATES DEPARTMENT OF AGRICULTURE  
BUREAU OF PUBLIC ROADS

Volume 18, No. 6

August 1937

*The reports of research published in this magazine are necessarily qualified by the conditions of the tests from which the data are obtained. Whenever it is deemed possible to do so, generalizations are drawn from the results of the tests; and, unless this is done, the conclusions formulated must be considered as specifically pertinent only to described conditions.*

## *In This Issue*

|                                               | Page |
|-----------------------------------------------|------|
| Tourist Travel in the United States . . . . . | 101  |

THE BUREAU OF PUBLIC ROADS - - - - - Willard Building, Washington, D. C.  
REGIONAL HEADQUARTERS - - - - - Federal Building, Civic Center, San Francisco, Calif.

## DISTRICT OFFICES

|                                                                                                                             |                                                                                                                                                               |
|-----------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------|
| DISTRICT No. 1. Oregon, Washington, and Montana.<br>Post Office Building, Portland, Oreg.                                   | DISTRICT No. 8. Alabama, Georgia, Florida, Mississippi, and Tennessee.<br>Post Office Building, Montgomery, Ala.                                              |
| DISTRICT No. 2. California, Arizona, and Nevada.<br>Federal Building, Civic Center, San Francisco, Calif.                   | DISTRICT No. 9. Connecticut, Maine, Massachusetts, New Hampshire, New Jersey, New York, Rhode Island, and Vermont.<br>505 Post Office Building, Albany, N. Y. |
| DISTRICT No. 3. Colorado, New Mexico, and Wyoming.<br>254 New Customhouse, Denver, Colo.                                    | DISTRICT No. 10. Delaware, Maryland, Ohio, Pennsylvania, and District of Columbia.<br>Willard Building, Washington, D. C.                                     |
| DISTRICT No. 4. Minnesota, North Dakota, South Dakota, and Wisconsin.<br>907 Post Office Building, St. Paul, Minn.          | DISTRICT No. 11. Alaska.<br>Room 419, Federal and Territorial Building, Juneau, Alaska.                                                                       |
| DISTRICT No. 5. Iowa, Kansas, Missouri, and Nebraska.<br>Masonic Temple Building, Nineteenth and Douglas Sts., Omaha, Nebr. | DISTRICT No. 12. Idaho and Utah.<br>Federal Building, Ogden, Utah.                                                                                            |
| DISTRICT No. 6. Arkansas, Louisiana, Oklahoma, and Texas.<br>Room 502, United States Court House, Fort Worth, Tex.          | DISTRICT No. 14. North Carolina, South Carolina, Virginia, and West Virginia.<br>Montgomery Building, Spartanburg, S. C.                                      |
| DISTRICT No. 7. Illinois, Indiana, Kentucky, and Michigan.<br>South Chicago Post Office Building, Chicago, Ill.             |                                                                                                                                                               |

Because of the necessarily limited edition of this publication it is impossible to distribute it free to any person or institutions other than State and county officials actually engaged in planning or constructing public highways, instructors in highway engineering, and periodicals upon an exchange basis. At the present time additions to the free mailing list can be made only as vacancies occur. Those desiring to obtain PUBLIC ROADS can do so by sending \$1 per year (foreign subscription \$1.50), or 10 cents per single copy, to the Superintendent of Documents, United States Government Printing Office, Washington, D. C.

---

CERTIFICATE: By direction of the Secretary of Agriculture, the matter contained herein is published as administrative information and is required for the proper transaction of the public business.

# TOURIST TRAVEL IN THE UNITED STATES

## A SUMMARY OF AVAILABLE DATA ON HIGHWAY USE BY TOURISTS

BY THE DIVISION OF HIGHWAY TRANSPORT, BUREAU OF PUBLIC ROADS

Reported by L. E. PEABODY, Senior Highway Economist, and I. MANSFIELD SPASOFF, Assistant Highway Economist



Photo Copyrighted by Asahel Curtis

MAJESTIC MOUNTAINS MIRRORED IN PLACID LAKES LURE TOURISTS TO MOUNT RANIER NATIONAL PARK, WASHINGTON.

**I**N RECENT years Americans have become more and more interested in visiting the historical and scenic attractions of the United States. With the improvement of each additional mile of highway, with the acquisition of each additional passenger car, and with the increase in personal income during the recent years of returning prosperity, ever-increasing numbers of tourists are traveling from end to end of the country. At the height of prosperity, estimates by investigators placed the value of American tourist business at several billion dollars annually.

In the wake of the downward plunge into depression, the paralysis of industry, the shrinking of values, and the reduction of income, the tourist business necessarily declined. The falling-off in tourist travel became most acute between 1930 and 1932. But this remarkable movement, which went down with the tide of prosperity,

appeared again on the crest of the first rising wave, for in 1934 total tourist expenditures in the United States were again estimated at several billion dollars. Estimates of trends in tourist travel and of the expenditures by tourists for the country as a whole are necessarily based on incomplete data since comprehensive records are not available.

The value of tourist trade has been estimated for a number of States. Maine ranks it second only to her entire agricultural output; California places it next in importance to her great petroleum industry; in Michigan, the center of the automotive industry, it ranks second; in Wisconsin its value as a producer of revenue is exceeded only by that of the dairy industry; and in Florida, during the 1935-36 season, it is estimated to have represented many times the value of the entire citrus fruit crop. From practically every State there

comes the story of a large increase in expenditures by tourists.

Throughout the United States the various means of transportation are developed to a high degree. One may go with facility by boat, train, automobile, or airplane from New York to San Francisco, the chief factors determining the choice being personal preference, expense, or time. Occasional estimates have been made of the extent to which each of these modes of travel is used by the American tourist, but few figures are available for determining a progressive trend over a series of years. It is certainly true, however, that the great majority of American tourists who are out to see their own country travel either by rail or automobile. Figures by the National Park Service of the United States Department of the Interior, relating to the number of visitors arriving by rail and by automobile at Yellowstone National Park each year from 1922 to 1930, inclusive, give an interesting glimpse of the trend in these modes of travel (see table 1).

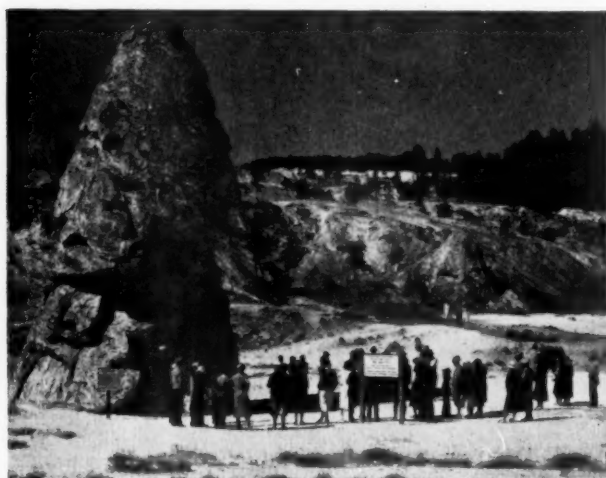


Photo by Courtesy of the United States Department of the Interior

YELLOWSTONE NATIONAL PARK IS ANNUALLY VISITED BY THOUSANDS OF TOURISTS FROM ALL PARTS OF THE COUNTRY. LIBERTY CAP, SHOWN ABOVE, IS BUT ONE OF A WIDE VARIETY OF ATTRACTIONS THAT INCLUDE GEYSERS, WATERFALLS, AND TOWERING MOUNTAINS.

#### LARGE MAJORITY OF VISITORS TO NATIONAL PARKS TRAVEL BY AUTOMOBILE

Figures from the same source show that during those years the number of visitors arriving by rail and automobile represented a fairly constant proportion of approximately 90 percent of all visitors to the park, with about 10 percent arriving by all other modes of transportation. Of the combined number of visitors arriving by rail and automobile, presented in table 1, an increasing trend is shown in the number arriving by automobile.

In 1922 the percentage of visitors arriving by rail was 33.7 percent, and that of visitors arriving by automobile was 66.3 percent of the combined total. With slight variations in the rates of change during subsequent years, the proportion of visitors arriving by automobile increased to 88.6 percent in 1930, while that of visitors arriving by rail declined to 11.4 percent. Comparable figures are not available for the years 1931 to 1935, but an estimate for 1936 indicates a continuation of the previous trend. This estimate shows that the

number of visitors arriving by rail had remained about constant at 22,000, while the number arriving by automobile had increased to 370,000, representing 5.6 and 94.4 percent, respectively, of the combined total.

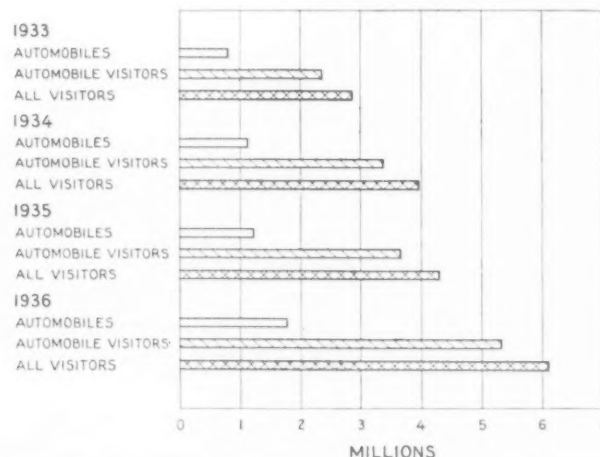


FIGURE 1.—NUMBER OF AUTOMOBILES AND VISITORS ENTERING ALL NATIONAL PARKS, 1933-36, INCLUSIVE.

TABLE 1.—Visitors to Yellowstone National Park from the continental United States, arriving by rail and by automobile 1922-30<sup>1</sup>

| Year | Visitors arriving by rail |         | Visitors arriving by automobile |         | Visitors arriving by rail and automobile |         |
|------|---------------------------|---------|---------------------------------|---------|------------------------------------------|---------|
|      | Number                    | Percent | Number                          | Percent | Number                                   | Percent |
| 1922 | 29,329                    | 33.7    | 57,775                          | 66.3    | 87,104                                   | 100.0   |
| 1923 | 34,781                    | 28.5    | 87,286                          | 71.5    | 122,067                                  | 100.0   |
| 1924 | 35,846                    | 27.0    | 96,884                          | 73.0    | 132,730                                  | 100.0   |
| 1925 | 39,940                    | 28.6    | 99,881                          | 71.4    | 139,821                                  | 100.0   |
| 1926 | 32,477                    | 19.8    | 131,895                         | 80.2    | 164,372                                  | 100.0   |
| 1927 | 38,811                    | 21.3    | 143,200                         | 78.7    | 182,011                                  | 100.0   |
| 1928 | 35,262                    | 17.2    | 169,436                         | 82.8    | 204,698                                  | 100.0   |
| 1929 | 34,789                    | 15.0    | 197,032                         | 85.0    | 231,821                                  | 100.0   |
| 1930 | 22,759                    | 11.4    | 176,910                         | 88.6    | 199,669                                  | 100.0   |

<sup>1</sup> Data compiled from releases of the National Park Service, United States Department of the Interior, and presented in Communication Agencies and Social Life by Willey and Rice; Recent Social Trends Monograph Series.

The years 1932 and 1933 witnessed a decline in tourist traffic in all parts of the United States, but this falling-off was followed by a marked increase in volume in many parts of the country during 1934, with continuation of the upward trend in 1935 and 1936. Data showing the total number of automobiles, automobile passengers, and all visitors, entering all national parks during the past 4 years, are presented in table 2 and are shown graphically in figure 1. A gradual increase in the number and percentage of visitors arriving by automobile is shown, but in 1935 the increase over 1934 was very slight, as was also the

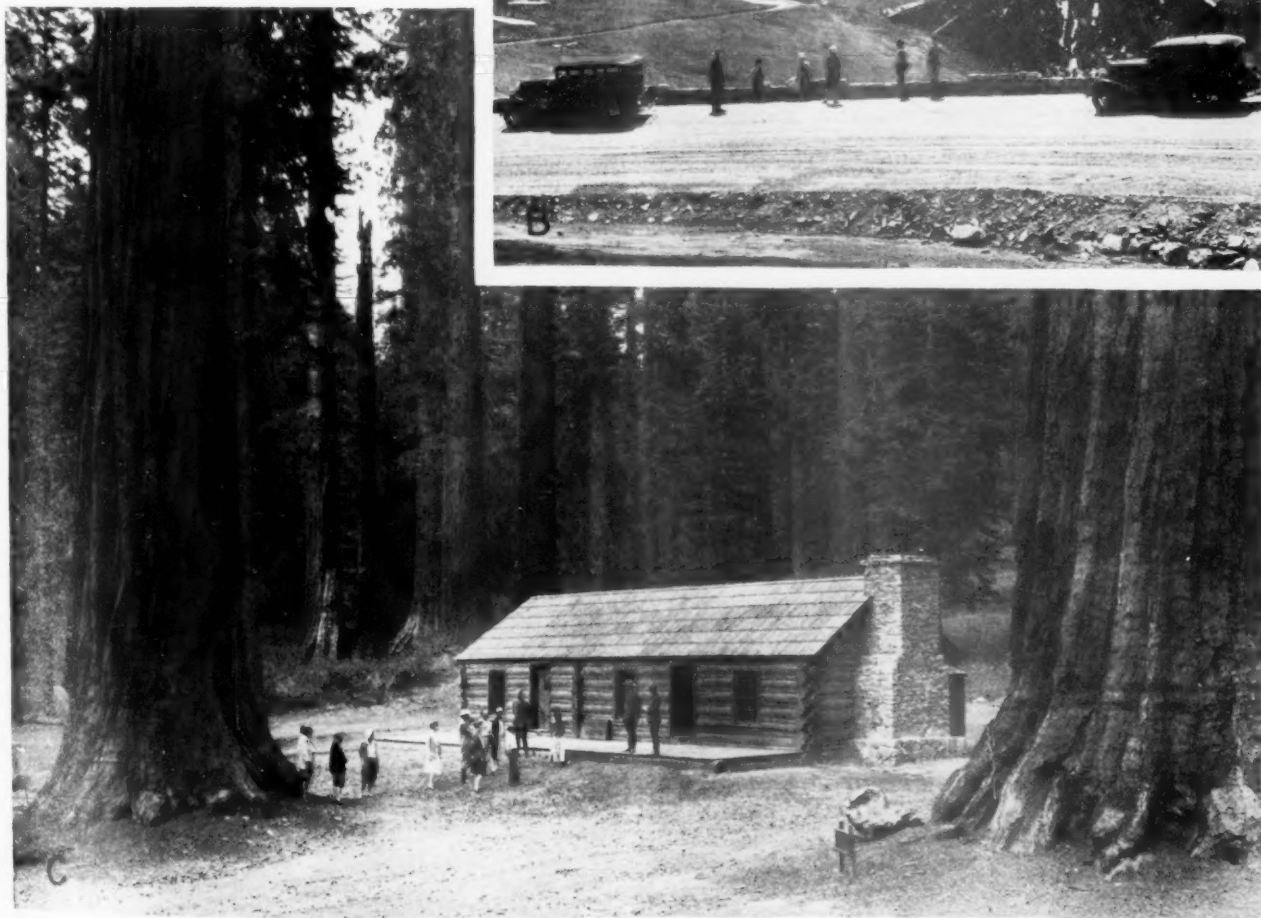
TABLE 2.—Total number of automobiles, automobile passengers, and all visitors, entering all national parks, 1933-36<sup>1</sup>

| Year | Cars      | Automobile visitors  |          | All visitors |          |
|------|-----------|----------------------|----------|--------------|----------|
|      |           | Persons <sup>2</sup> | Increase | Number       | Increase |
|      |           |                      | Percent  |              | Percent  |
| 1933 | 788,809   | 2,366,427            |          | 2,867,374    |          |
| 1934 | 1,124,586 | 3,373,758            | 42.6     | 3,965,720    | 38.3     |
| 1935 | 1,217,054 | 3,651,162            | 8.2      | 4,284,615    | 8.0      |
| 1936 | 1,772,538 | 5,317,014            | 45.6     | 6,082,081    | 42.0     |

<sup>1</sup> Basic data supplied by National Park Service, U. S. Department of the Interior.

<sup>2</sup> Estimated on the basis of an average of 3 passengers to a car.





Photos by Courtesy of the United States Department of the Interior

VIEWS IN THREE NATIONAL PARKS IN DIFFERENT PARTS OF THE COUNTRY, THAT ATTRACT TOURISTS FROM FAR DISTANT POINTS. A, THE SKYLINE DRIVE, IN THE SHENANDOAH NATIONAL PARK, WILL EVENTUALLY EXTEND SOUTH AND WEST INTO THE GREAT SMOKY MOUNTAINS NATIONAL PARK OF NORTH CAROLINA AND TENNESSEE; B, TRAIL RIDGE ROAD WITH LONG'S PEAK IN THE DISTANCE IN ROCKY MOUNTAIN NATIONAL PARK, COLORADO; C, GIANT REDWOOD TREES IN YOSEMITE NATIONAL PARK, CALIFORNIA.

ease with regard to all visitors. Judging from fragmentary records, estimates, and news items, the trend of tourist activity seems to have been approximately the same in various resort areas, with the definite improvement in 1934 being sustained in succeeding years.

#### NEED FOR ACCURATE DATA ON TOURIST TRAFFIC RECOGNIZED

Up to a comparatively recent date, measures of the actual volume and value of annual tourist traffic were largely conjectural. There was comparatively little direct information available for making such estimates. The very difficulty of making reasonable estimates, however, and the stimulating effect of competition among the individual States for a share in the motor tourist business resulted in a more systematic effort to obtain accurate basic information. Automobile clubs and tourist organizations have been active in collecting this type of information from their contacts in many localities. An estimate made by the American Automobile Association of the geographic distribution of motor tourist traffic in 1928, one of the biggest tourist years, is the only one of its kind that has been discovered in the course of considerable search. According to this estimate, the distribution of motor tourist traffic among the various resort areas during that year, was as follows:

|                                           | Percent |
|-------------------------------------------|---------|
| Far West, Great Lakes, and Southwest..... | 59      |
| Northeast.....                            | 11      |
| Central Appalachian.....                  | 9       |
| Northwest.....                            | 7       |
| Southeast.....                            | 5       |
| Gulf and Central.....                     | 2       |
| Observed in home State.....               | 7       |

Through their State highway departments, or through organizations sponsored by various business interests, many States have started to compile specific data relating to their tourist traffic. At regular intervals since 1923, at 33 points along the State line, the Wisconsin Highway Commission has conducted a traffic census of out-of-State cars entering and leaving the State during the 100 days between June 1 and Labor Day. A questionnaire card, to be filled out and returned by each driver, covers the length and cost of his visit, the distance traveled, and the reason for his trip.

At Bath, Maine, a record has been kept for years of all highway traffic crossing the Kennebec River on the only direct highway from Portland and points south to resorts along the upper Maine coast. A State development commission was created by the New Hampshire Legislature in 1925. The New England Council, also organized in 1925, has since then coordinated the work of the six New England States, with a view to developing and publicizing their recreational advantages. This organization was originally sponsored by the business interests of the several States; but in 1935, through official action of the legislatures and governors, public funds were made available to carry on the work. During that same year (1935) the Governor of New York signed a bill appropriating money for the establishment of a publicity bureau in that State.

In California, both the department of motor vehicles and the department of agriculture have made counts of cars of out-of-State registration entering the State. Analytical studies of tourist traffic to California have also been published by Californians, Inc., and by the All-Year-Club of Southern California. The Colorado Association has made similar studies of tourist traffic in that State.

Within recent years, surveys of the movement of motor traffic upon their highways have been made by the highway departments of a number of States, independently or in cooperation with the Bureau of Public Roads. In the earliest of these, very little information relating to tourist traffic was obtained. The most that can be found in some of the published reports is the volume or relative importance of out-of-State passenger-car traffic. But the later studies present a more detailed analysis of the characteristics of automobile tourist traffic.

The reports of surveys that were made in a number of Northeastern States between 1924 and 1927 showed the percentage of out-of-State cars on the State highways during the summer months, as follows: New Hampshire, 51.1 percent; Vermont, 36.6 percent; Maine, 23.3 percent; Connecticut, 21.1 percent; Pennsylvania, 14.0 percent; and Ohio, 10.2 percent. The actual volume of traffic indicated by these percentages depends upon the total amount of traffic within each State. Therefore, such percentages should not be taken as an index of the relative importance of tourist traffic visiting these States. For example, insofar as motor-vehicle registration can be taken as a rough measure of relative State traffic, 51 percent of all passenger vehicles registered in New Hampshire would be less than one-third of the number represented by 10 percent of passenger-vehicle registrations in Ohio. The percentages given are of value only in relation to traffic within the individual State and have no significance from a national point of view.

#### TOURIST FIGURES AVAILABLE FOR 11 WESTERN STATES AND MICHIGAN, FLORIDA, AND ARKANSAS

The survey of traffic on the Federal-aid highway systems of 11 Western States, made between September 1929 and October 1930, revealed figures showing for each State the number of visiting cars registered in each of the 11 States and in other areas throughout the Nation. The average daily mileage traveled by out-of-State cars was also recorded. No information regarding expenditures by these quasi-tourist groups was obtained in connection with that survey, however.

A similar survey of highway transportation in the State of Michigan was made between July 1930 and July 1931. By means of questionnaire cards, information was obtained regarding the place of origin, number of persons in the party, duration of the visit, trip mileage within the State, and type of accommodation used. Based on information from various sources, such as tourist associations and automobile clubs, an estimate of expenditures was also made in connection with this survey.

In a general survey of traffic in the State of Florida, made between October 1933 and October 1934, the information obtained in regard to out-of-State passenger car traffic was the same as that recorded in the Michigan survey except that the questionnaire card contained an additional inquiry regarding the specific purpose of the visit. Based on average figures reported by a large number of separate parties of various types, estimates of total and average expenditures were also made.

The tourist questionnaire card used in connection with the Arkansas traffic survey, conducted between April 1934 and June 1935, was similar to that used in the Florida survey, except that the purpose of the visit was limited to the simple designation of

"business or pleasure", instead of the longer enumeration used on the Florida questionnaire card. No estimate of expenditures was made in connection with this survey.

Thus, it will be seen that data are available, in the reports of the highway surveys mentioned, regarding the place of origin and average daily mileage traveled by out-of-State automobile traffic in 11 western States, viz, Arizona, California, Colorado, Idaho, Nebraska, Nevada, New Mexico, Oregon, Utah, Washington, and Wyoming, and in Michigan and Florida. Data relating to the origin of out-of-State cars are also available

In the various traffic reports already described, the term "tourist" is used to describe traffic originating outside of the State and visiting the State for more than 1 day. It is not limited to those traveling for recreation, and includes those making business trips. In the more recent surveys in Florida and Michigan, persons visiting the State for 1 day or less were not classified as tourists, while in Arkansas information was obtained regarding the number of cars in the State on business, and details relating to cars passing through the State en route to other States were shown in certain tabulations.



Photo by California State Highway Department

TOURIST TRAFFIC IS ENCOURAGED AND THE TOURIST SEASON IS LENGTHENED IN MANY STATES BY SNOW REMOVAL ON THE MAIN HIGHWAYS.

in the Arkansas report, but trip mileage figures are not shown for that State. The number of persons per car, duration of visit in days, and type of accommodation used are recorded for Michigan, Florida, and Arkansas; estimates of expenditures are included in the Michigan and Florida reports; and the purpose of the visit is given in those of Florida and Arkansas. Similar information compiled in connection with studies of tourist traffic made by governmental or other organizations, is also of interest in a discussion of these several characteristics of American tourist traffic.

#### WEALTHY, DENSELY POPULATED AREAS PROLIFIC SOURCES OF AUTOMOBILE TOURIST TRAFFIC

The determining factors reflected in the volume of out-of-State passenger car traffic are manifold. One set of factors exerts its influence from the point of origin of such traffic, and another from the point of destination. The former acts as a centrifugal force, tending to drive traffic out from a certain point; the other acts as a centripetal force, exerting a pull toward another point. Included in the first set of factors are actual population and population density per square mile,



together with passenger-car registration and reported total income. The volume of outgoing tourist traffic may be expected to vary directly with the magnitude of these several influences. The second set involves the extent and perfection of highway development in the area or State of destination; the less tangible factors represented by climatic, recreational, health, or scenic attractions; and the extent of influence of all these through direct knowledge, hearsay, or publicity.

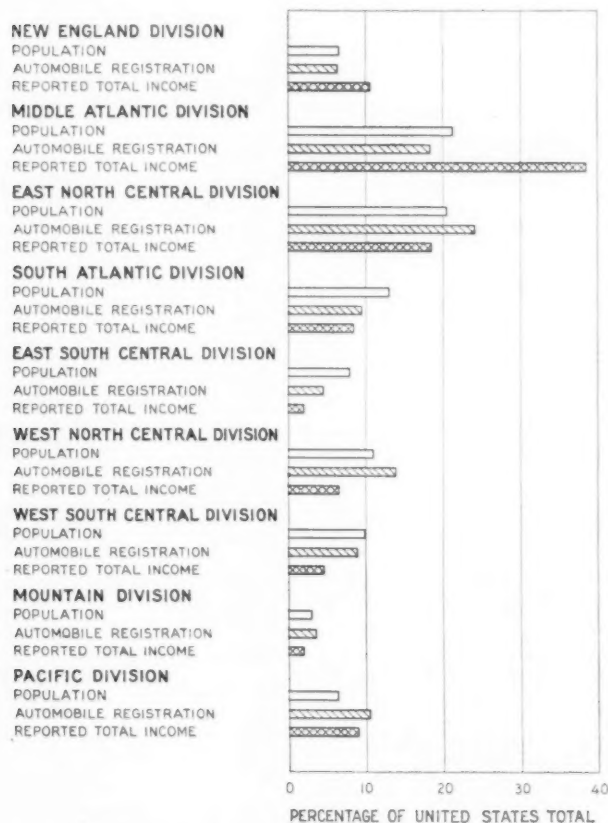


FIGURE 2.—RELATIVE IMPORTANCE OF EACH GEOGRAPHIC DIVISION IN VARIOUS FACTORS AFFECTING ORIGIN OF AUTOMOBILE TOURIST TRAFFIC.

Yet another factor, which exerts a tremendous influence either as an attraction or as a repellent, is distance. The proximity of certain points of interest to areas of origin tends to attract tourist traffic which would be unlikely to visit similar points at a greater distance. Thus, the factor of distance may be said to work inversely, all other things being equal, i. e., the greater the distance between origin and destination, the less the volume of automobile tourist traffic.

Varying amounts of tourist travel (as defined in the traffic reports by the Bureau) result from the normal transaction of business. Although short trips of less than a day's duration may be eliminated in the traffic survey reports, there are many who remain in the State for more than 1 day on business trips. Business activity within the State and the nearness of large cities beyond the State borders are important factors. The size of the State and the extent to which it is traversed by through highways carrying traffic destined primarily for other States are also important. A centrally located State may have much traffic consisting of cars making business trips.

The relative importance of various sections of the United States as potential sources of automobile tourist traffic is indicated by the figures in tables 3 and 4, and the principal data are also shown graphically in figure 2. As in almost every other line of business activity, the centers of greatest population offer the most promising market for the "sale" of tourist trips. Both the greatest actual population and the greatest density per square mile are found in the Middle Atlantic States—New York, New Jersey, and Pennsylvania. Next in importance in actual population are the East North Central States—Ohio, Indiana, Illinois, Michigan, and Wisconsin—though the population density is less in this area than in New England. The Middle Atlantic and East North Central States also show the greatest percentages of passenger-vehicle registrations, as well as of total income reported on income tax returns. The concentration of these significant factors in the States east of the Mississippi, and north of the Ohio River, justifies the assumption that this area should contribute more tourists to the great annual migration than any other part of the country.

TABLE 3.—Population and passenger-vehicle registration by geographic divisions and sections, 1936

| Geographic division, <sup>1</sup> and section | Population          |                                   |                 | Passenger vehicle registration <sup>2</sup> |                                   |
|-----------------------------------------------|---------------------|-----------------------------------|-----------------|---------------------------------------------|-----------------------------------|
|                                               | Number <sup>2</sup> | Percentage of United States total | Per square mile | Number                                      | Percentage of United States total |
|                                               | 1,000 persons       |                                   |                 | 1,000 vehicles                              |                                   |
| New England.....                              | 8,581               | 6.7                               | 138.5           | 1,509                                       | 6.2                               |
| Middle Atlantic.....                          | 27,399              | 21.3                              | 274.0           | 4,578                                       | 18.9                              |
| East North Central.....                       | 25,708              | 20.0                              | 104.7           | 5,752                                       | 23.8                              |
| South Atlantic.....                           | 17,072              | 13.3                              | 63.4            | 2,459                                       | 10.2                              |
| East South Central.....                       | 10,619              | 8.3                               | 59.2            | 1,052                                       | 4.4                               |
| East of the Mississippi River.....            | 89,379              | 69.6                              | 104.4           | 15,350                                      | 63.5                              |
| West North Central.....                       | 13,782              | 10.7                              | 27.0            | 3,134                                       | 13.0                              |
| West South Central.....                       | 12,790              | 10.0                              | 29.8            | 2,028                                       | 8.4                               |
| Mountain.....                                 | 3,759               | 2.9                               | 4.4             | 887                                         | 3.7                               |
| Pacific.....                                  | 8,719               | 6.8                               | 27.4            | 2,757                                       | 11.4                              |
| West of the Mississippi River.....            | 39,050              | 30.4                              | 18.4            | 8,806                                       | 36.5                              |
| United States total.....                      | 128,429             | 100.0                             | 43.2            | 24,157                                      | 100.0                             |

<sup>1</sup> The classification used is that of the Bureau of the Census, as follows: New England—Maine, New Hampshire, Vermont, Massachusetts, Rhode Island, Connecticut; Middle Atlantic—New York, New Jersey, Pennsylvania; East North Central—Ohio, Indiana, Illinois, Michigan, Wisconsin; South Atlantic—Delaware, Maryland, District of Columbia, West Virginia, Virginia, North Carolina, South Carolina, Georgia, Florida; East South Central—Kentucky, Tennessee, Alabama, Mississippi; West North Central—Minnesota, Iowa, Missouri, North Dakota, South Dakota, Nebraska, Kansas; West South Central—Arkansas, Louisiana, Oklahoma, Texas; Mountain—Montana, Idaho, Wyoming, Colorado, New Mexico, Arizona, Utah, Nevada; Pacific—Washington, Oregon, California.

<sup>2</sup> Midyear estimates of the U. S. Bureau of the Census.  
<sup>3</sup> Bureau of Public Roads figures, compiled from reports by State authorities. For the majority of States the registration of private passenger cars is not shown separately; but for those in which this distinction is made, private cars constitute about 99 percent of total passenger-vehicle registration.

#### EASTERN STATES HAVE ONE-HALF OF THE SURFACED ROADS BUT ONLY ONE-FOURTH OF THE LAND AREA OF THE UNITED STATES

More than half of the surfaced mileage of State highway systems is found east of the Mississippi River, where less than 29 percent of the total land area is located; and more than 31 percent of this class of roads is in the northeastern States which comprise less than 14 percent of the total land area of the United States. Therefore, it may be assumed that the States east of the Mississippi River, especially the northeastern group, are the most fruitful field of origin of tourist traffic and are also outstanding in highway facilities to at-



TABLE 4.—Individual income reported on income tax returns by geographic divisions and sections, 1932<sup>1</sup>

| Geographic division and section <sup>2</sup> | Income-tax returns |                                       | Total reported income |                                   |                | Income other than earned and business |                                   |
|----------------------------------------------|--------------------|---------------------------------------|-----------------------|-----------------------------------|----------------|---------------------------------------|-----------------------------------|
|                                              | Number             | Percentage of population <sup>3</sup> | Amount                | Percentage of United States total | Average income | Amount                                | Percentage of United States total |
|                                              |                    |                                       | 1,000 dollars         |                                   | Dollars        | 1,000 dollars                         |                                   |
| New England.....                             | 413,699            | 5.0                                   | 1,500,276             | 10.5                              | 3,626          | 552,095                               | 12.4                              |
| Middle Atlantic.....                         | 1,350,968          | 5.1                                   | 5,506,347             | 38.4                              | 4,076          | 1,940,787                             | 43.5                              |
| East North Central.....                      | 757,823            | 2.9                                   | 2,685,296             | 18.7                              | 3,543          | 690,856                               | 15.4                              |
| South Atlantic.....                          | 335,461            | 2.1                                   | 1,235,522             | 8.6                               | 3,683          | 366,262                               | 8.2                               |
| East South Central.....                      | 95,225             | 1.0                                   | 322,615               | 2.2                               | 3,388          | 79,965                                | 1.8                               |
| East of the Mississippi River.....           | 2,953,176          | 3.4                                   | 11,250,026            | 78.4                              | 3,809          | 3,629,965                             | 81.3                              |
| West North Central.....                      | 272,633            | 2.0                                   | 931,102               | 6.5                               | 3,415          | 234,941                               | 5.3                               |
| West South Central.....                      | 179,122            | 1.4                                   | 629,869               | 4.4                               | 3,516          | 167,750                               | 3.7                               |
| Mountain.....                                | 82,378             | 2.2                                   | 263,324               | 1.8                               | 3,197          | 67,453                                | 1.5                               |
| Pacific.....                                 | 377,929            | 4.4                                   | 1,272,966             | 8.9                               | 3,368          | 364,127                               | 8.2                               |
| West of the Mississippi River.....           | 912,062            | 2.4                                   | 3,097,261             | 21.6                              | 3,396          | 834,271                               | 18.7                              |
| United States total.....                     | 3,865,238          | 3.1                                   | 14,347,287            | 100.0                             | 3,712          | 4,464,236                             | 100.0                             |

<sup>1</sup> Figures are from Statistics of Income, Report of the Commissioner of Internal Revenue, Treasury Department, and are for the continental United States, not including Hawaii.

<sup>2</sup> See note 1 table 3.

<sup>3</sup> Based on midyear estimates of population in 1932.



Upper Photo by Rhode Island State Highway Department

ROADSIDE FACILITIES AWAIT USE BY THE TIRED AND HUNGRY TOURIST. A, FULLY EQUIPPED PICNIC AREA IN RHODE ISLAND. B, ROADSIDE CABIN CAMP IN WEST VIRGINIA.

tract such traffic. The greater distances found in the central plains and Western States may be expected to act as a restraint upon the interchange of tourist traffic between eastern and western parts of the country. The figures in table 5 show the actual mileage and distribution of surfaced highways in each geographic division, and the relative importance of such highways in relation to total land area.



A, ROADSIDE DRINKING FOUNTAINS, SUCH AS THIS ONE IN WEST VIRGINIA, INVITE THE THIRSTY TOURIST TO STOP AND REFRESH HIMSELF. B, THIS OVERLOOK ON THE SKYLINE DRIVE IN VIRGINIA IS TYPICAL OF MANY SUCH ACCOMMODATIONS FOR MOTORISTS.

It would be impossible to enumerate the points of interest in every part of the country which may be credited with different degrees of influence in attracting tourists to individual States. New England and the Great Lakes region have their cool summer climate, and Florida her warm winter sun; the variety of both its climate and scenery recommend California as an all-year resort and playground; and national parks beckon from far and near to lovers of nature throughout the land. The reasons for individual choice of a vacation's locale are of almost infinite variety.

TABLE 5.—Surfaced mileage on primary State highway systems<sup>1</sup> and land area per mile of such highways, by geographic divisions and sections, 1935

| Geographic division <sup>2</sup> and section | Surfaced State highways |                                   | Land area, square miles |                                    |
|----------------------------------------------|-------------------------|-----------------------------------|-------------------------|------------------------------------|
|                                              | Number of miles         | Percentage of United States total | Total                   | Per mile of surfaced State highway |
| New England.....                             | 10,807                  | 3.7                               | 61,976                  | 5.7                                |
| Middle Atlantic.....                         | 28,635                  | 9.7                               | 100,000                 | 3.5                                |
| East North Central.....                      | 52,291                  | 17.8                              | 245,564                 | 4.7                                |
| South Atlantic.....                          | 46,821                  | 15.9                              | 269,011                 | 5.7                                |
| East South Central.....                      | 22,463                  | 7.6                               | 179,509                 | 8.0                                |
| East of the Mississippi River.....           | 161,017                 | 54.7                              | 856,060                 | 5.3                                |
| West North Central.....                      | 53,647                  | 18.2                              | 510,804                 | 9.5                                |
| West South Central.....                      | 53,793                  | 11.5                              | 429,746                 | 12.7                               |
| Mountain.....                                | 25,449                  | 8.7                               | 859,000                 | 33.7                               |
| Pacific.....                                 | 20,274                  | 6.9                               | 318,095                 | 15.7                               |
| West of the Mississippi River.....           | 133,163                 | 45.3                              | 2,117,654               | 15.9                               |
| United States total.....                     | 294,180                 | 100.0                             | 2,973,714               | 10.1                               |

<sup>1</sup> Includes urban extensions on designated State systems.

<sup>2</sup> States included in the respective geographic divisions are listed in note 1 of table 3.

<sup>3</sup> Does not include the District of Columbia.

The amount of publicity given certain areas through Nation-wide or local advertising campaigns is a factor of no small importance. According to testimony presented at a hearing before a subcommittee on interstate and foreign commerce of the United States House of Representatives: "It has been estimated that in 1930, \$50,000,000 was spent in advertising travel objectives, the funds being provided by transportation agencies, States, local communities, hotels, regional associations, and various business interests."

It is interesting to note, in this connection, the experience of the New England Council during 4 years of systematic advertising. The primary circulation of its advertising media during this period was 120,000,000. As a result of this advertising 125,000 inquiries were received, representing the awakening of active interest in approximately one per thousand, or about one-tenth of 1 percent, of the possible prospects. It is impossible to determine how many of these inquirers actually made trips to New England; and it is also impossible to estimate how many made trips as a result of such advertising.

There are still other occasional or accidental factors that influence the distribution of tourist traffic. Local fairs or expositions, or the opening of national park or scenic areas, hitherto inaccessible to large numbers of tourists, may cause a great temporary influx of tourist traffic, which will continue in much smaller volume after the novelty has passed. Another factor is the location of features of comparatively minor interest which would attract few visitors except for their nearness to the line of travel to other important tourist meccas.

#### VOLUME OF TOURIST TRAFFIC FOUND TO VARY INVERSELY WITH DISTANCE OF TRAVEL

The importance of distance in determining the proportion of tourist automobile traffic originating in various parts of the country is illustrated in the figures for 11 Western States, and also in those for Michigan, Florida, and Arkansas. Three of the 11 Western States participating in the traffic survey of 1929-30 are on the Pacific coast, 7 are Mountain States, and Nebraska is one of the most westerly of the Central Plains States.

When the figures reported for out-of-State passenger cars in these States are combined into sectional groups, as shown in table 6, the effect of distance may be readily seen. The Pacific States received only 12.4 percent of their out-of-State traffic from States east of the Mississippi River, while the Mountain States received 15.6 percent from that area, and Nebraska 20.1 percent. The Pacific States, because of their accessibility to visitors from Mexico and Canada, had relatively more traffic from foreign countries than did the Mountain States or Nebraska. Including this foreign passenger-car traffic, the percentage of out-of-State traffic from points west of the Mississippi River was complementary to the figures listed above, being 87.6 percent for the Pacific States, 84.4 percent for the Mountain States, and 79.9 percent for Nebraska.

In addition to this tendency for the amount of out-of-State passenger-car traffic to vary inversely with the distance of travel, a comparison of the percentages for the States in each group illustrates the strength of the tourist appeal of particular areas. In the Pacific group, for example, California drew 25.2 percent of its tourist traffic from east of the Mississippi River, in

TABLE 6.—Origin of out-of-State passenger car traffic in 11 Western States, 1929-30; percentage distribution

| Area of origin <sup>1</sup>                                         | Traffic in Pacific States |            |                       | Traffic in Mountain States |                       |                       | Traffic in Nebraska |
|---------------------------------------------------------------------|---------------------------|------------|-----------------------|----------------------------|-----------------------|-----------------------|---------------------|
|                                                                     | All States                | California | 2 States <sup>2</sup> | All States <sup>3</sup>    | 5 States <sup>4</sup> | 2 States <sup>5</sup> |                     |
|                                                                     | Per-cent                  | Per-cent   | Per-cent              | Per-cent                   | Per-cent              | Per-cent              | Per-cent            |
| New England States.....                                             | 1.0                       | 2.0        | 0.5                   | 1.0                        | 1.1                   | 0.8                   | 0.9                 |
| Middle Atlantic and East North Central States <sup>6</sup> .....    | 10.2                      | 20.9       | 4.9                   | 13.1                       | 15.0                  | 8.2                   | 18.2                |
| South Atlantic and East South Central States <sup>7</sup> .....     | 1.2                       | 2.3        | .6                    | 1.5                        | 1.7                   | .9                    | 1.0                 |
| East of the Mississippi River.....                                  | 12.4                      | 25.2       | 6.0                   | 15.6                       | 17.8                  | 9.9                   | 20.1                |
| West North Central and West South Central States <sup>8</sup> ..... | 10.1                      | 17.4       | 6.4                   | 28.2                       | 35.0                  | 11.5                  | 31.5                |
| Mountain States <sup>9</sup> .....                                  | 14.4                      | 18.3       | 12.4                  | 21.0                       | 20.3                  | 22.7                  | 17.6                |
| Pacific States.....                                                 | 37.7                      | 35.1       | 69.0                  | 34.5                       | 26.3                  | 55.0                  | 10.4                |
| West of the Mississippi River.....                                  | 82.2                      | 70.8       | 87.8                  | 83.7                       | 81.6                  | 89.2                  | 79.5                |
| United States, total.....                                           | 94.6                      | 96.0       | 93.8                  | 99.3                       | 99.4                  | 99.1                  | 99.6                |
| Foreign countries.....                                              | 5.4                       | 4.0        | 6.2                   | .7                         | .6                    | .9                    | .4                  |
| Grand total.....                                                    | 100.0                     | 100.0      | 100.0                 | 100.0                      | 100.0                 | 100.0                 | 100.0               |

<sup>1</sup> Except as noted, States are grouped according to the census classification. See note 1 of table 3.

<sup>2</sup> Washington and Oregon.

<sup>3</sup> Except Montana.

<sup>4</sup> Wyoming, Colorado, New Mexico, Arizona, and Utah.

<sup>5</sup> Idaho and Nevada.

<sup>6</sup> Includes Delaware and Maryland.

<sup>7</sup> Does not include Delaware and Maryland.

<sup>8</sup> Includes Montana.

contrast to only 6 percent for Washington and Oregon combined. Similarly, five mountain States of major tourist interest received 17.8 percent of their tourist traffic from that area, in comparison with 9.9 percent for Nevada and Idaho. Corresponding figures for individual States are presented in table 7.

#### EIGHTY PERCENT OF MICHIGAN'S TOURIST TRAFFIC CAME FROM FOUR NEIGHBORING STATES

The influence of distance on the amount of out-of-State passenger-car traffic is also clearly illustrated by the figures in table 8, which are derived from traffic reports for Michigan, Florida, and Arkansas. As has already been pointed out, the East North Central States are among the most important in the principal factors contributing to the creation of considerable tourist traffic. Michigan is one of these States, and may be expected to draw heavily upon this reservoir of potential tourist traffic because of its proximity. The estimated total number of out-of-State cars visiting Michigan during the period of the traffic survey was 2,500,000 annually, which is equal to nearly 11 percent of all passenger vehicles registered outside the State of Michigan during 1930. For no other State except Wisconsin, which enjoys advantages of climate and location similar to those of Michigan, have figures been found which approach that volume of tourist car traffic, the number of visiting cars reported for Wisconsin being 1,902,500 in 1931.

Michigan's tourist appeal is recorded not only in the volume, but also in the widespread origin of its tourist traffic. A news item published in June 1935 stated that, among visitors who registered at a tourist lodge and clearing-house of information during the month after its establishment near the Indiana border, there were persons from 42 States and 2 foreign countries. The distribution according to point of origin of passenger cars visiting Michigan, recorded in the survey of

TABLE 7.—Origin of out-of-State passenger car traffic in each of 11 Western States, 1929-30, percentage distribution

| Area of origin <sup>1</sup>                                         | Traffic in Pacific States |        |            | Traffic in Mountain States <sup>2</sup> |         |          |            |         |       |        | Traffic in Nebraska |
|---------------------------------------------------------------------|---------------------------|--------|------------|-----------------------------------------|---------|----------|------------|---------|-------|--------|---------------------|
|                                                                     | Washington                | Oregon | California | Idaho                                   | Wyoming | Colorado | New Mexico | Arizona | Utah  | Nevada |                     |
| New England States.....                                             | 0.5                       | 0.4    | 2.0        | 0.6                                     | 1.0     | 1.1      | 0.9        | 1.2     | 1.2   | 0.9    | 0.9                 |
| Middle Atlantic and East North Central States <sup>3</sup> .....    | 5.7                       | 4.1    | 20.9       | 7.9                                     | 17.7    | 17.3     | 12.3       | 16.4    | 11.3  | 8.6    | 18.2                |
| South Atlantic and East South Central States <sup>4</sup> .....     | .7                        | .6     | 2.3        | .8                                      | 1.3     | 2.0      | 1.8        | 2.3     | 1.3   | 1.0    | 1.0                 |
| East of the Mississippi River.....                                  | 6.9                       | 5.1    | 25.2       | 9.3                                     | 20.0    | 20.4     | 15.0       | 19.9    | 13.8  | 10.5   | 20.1                |
| West North Central and West South Central States <sup>5</sup> ..... | 7.2                       | 5.7    | 17.4       | 14.1                                    | 41.9    | 52.5     | 45.6       | 22.3    | 12.6  | 8.8    | 51.5                |
| Mountain States <sup>2</sup> .....                                  | 14.5                      | 10.4   | 18.3       | 25.3                                    | 25.4    | 12.6     | 19.0       | 11.7    | 33.1  | 20.0   | 17.6                |
| Pacific States.....                                                 | 61.4                      | 76.5   | 35.1       | 49.5                                    | 12.1    | 14.0     | 20.0       | 45.5    | 39.8  | 60.6   | 10.4                |
| West of the Mississippi River.....                                  | 83.1                      | 92.6   | 70.8       | 88.9                                    | 79.4    | 79.1     | 84.6       | 79.5    | 85.5  | 89.4   | 79.5                |
| United States total.....                                            | 90.0                      | 97.7   | 96.0       | 98.2                                    | 99.4    | 99.5     | 99.6       | 99.4    | 99.3  | 99.9   | 99.6                |
| Foreign countries.....                                              | 10.0                      | 2.3    | 4.0        | 1.8                                     | .6      | .5       | .4         | .6      | .7    | .1     | .4                  |
| Grand total.....                                                    | 100.0                     | 100.0  | 100.0      | 100.0                                   | 100.0   | 100.0    | 100.0      | 100.0   | 100.0 | 100.0  | 100.0               |

<sup>1</sup> See note 1, table 6.<sup>2</sup> Except Montana.<sup>3</sup> Includes Delaware and Maryland.<sup>4</sup> Does not include Delaware and Maryland.<sup>5</sup> Includes Montana.TABLE 8.—Estimated number and percentage distribution of out-of-State passenger cars <sup>1</sup> in Michigan, 1930-31; Florida, 1933-34; and Arkansas, 1934-35, by area of origin

| Area of origin <sup>2</sup>                           | Michigan             |                     | Florida              |                     | Arkansas       |                     |
|-------------------------------------------------------|----------------------|---------------------|----------------------|---------------------|----------------|---------------------|
|                                                       | Number of cars       | Percentage of total | Number of cars       | Percentage of total | Number of cars | Percentage of total |
| New England States.....                               | 23,675               | 1.0                 | 12,530               | 3.0                 | 3,838          | 0.4                 |
| Middle Atlantic States.....                           | <sup>3</sup> 134,948 | 5.7                 | 56,500               | 13.5                | 16,310         | 1.7                 |
| East North Central States.....                        | 1,877,427            | 79.3                | 44,930               | 10.8                | 74,833         | 7.8                 |
| South Atlantic and East South Central States.....     | <sup>4</sup> 56,820  | 2.4                 | <sup>5</sup> 274,450 | 65.7                | 230,256        | 24.0                |
| East of the Mississippi River.....                    | 2,092,870            | 88.4                | 388,410              | 93.0                | 325,237        | 33.9                |
| West North Central and West South Central States..... | 158,622              | 6.7                 | <sup>6</sup> 21,810  | 5.2                 | 597,706        | 62.3                |
| Mountain and Pacific States.....                      | 49,718               | 2.1                 | 5,610                | 1.3                 | 34,538         | 3.6                 |
| West of the Mississippi River.....                    | 208,340              | 8.8                 | 27,420               | 6.5                 | 632,244        | 65.9                |
| United States total.....                              | 2,301,210            | 97.2                | 415,830              | 99.5                | 957,481        | 99.8                |
| Foreign countries.....                                | 66,290               | 2.8                 | 2,130                | .5                  | 1,919          | .2                  |
| Grand total.....                                      | 2,367,500            | 100.0               | 417,960              | 100.0               | 959,400        | 100.0               |

<sup>1</sup> Does not include those driving through or making trips of less than 1 day.<sup>2</sup> See note 1, table 6.<sup>3</sup> Includes Delaware and Maryland.<sup>4</sup> Does not include Delaware and Maryland.<sup>5</sup> Does not include Mississippi.<sup>6</sup> Includes Mississippi.

highway transportation of that State, shows that 79.3 percent originated in neighboring States—Ohio, Indiana, Illinois, and Wisconsin—5.7 percent in the Middle Atlantic States, including Delaware and Maryland; and 6.7 percent in the central plains States. In the aggregate, 88.4 percent of Michigan's total tourist traffic came from east of the Mississippi River, 8.8 percent from west of it, and 2.8 percent from Canada.

According to figures contained in the traffic survey, the estimated total number of out-of-State cars visiting Florida annually was 515,000, or an equivalent of 2.5 percent of all passenger vehicles registered outside of Florida in 1933. Florida drew 65.7 percent of its tourist traffic from the Southern States east of the Mississippi River except the State of Mississippi, which was combined in the report with the West South Central States; 27.3 percent was from the Northeastern States; and of the remainder 6.5 percent was from Mississippi

and all States west of the Mississippi River, and 0.5 percent was from foreign countries.

#### CARS ON BUSINESS TRIPS CONSTITUTED LARGE PART OF OUT-OF-STATE TRAFFIC IN ARKANSAS

Although in the report of the traffic survey the total volume of out-of-State passenger-car traffic in Arkansas was estimated to be approximately 1,492,000 cars annually, a large part of these were making trips of less than 1 day's duration, many of these being recorded in the vicinity of Memphis, Tenn. In estimating the relative importance of recreational travel to this State, allowance should be made for business travel. This may be partly accomplished by deducting 532,600 cars reported as making trips of less than 1 day, leaving approximately 959,400 out-of-State cars annually visiting Arkansas for more than 1 day. An unknown portion of this traffic was for business purposes, since 60.8 percent of the total out-of-State traffic was classified as business. Probably the business traffic was much more heavily represented in the 532,600 cars visiting the State for less than 1 day than in the 959,400 cars staying longer, but such traffic undoubtedly constituted an important part of both groups.

Distributed according to point of origin, 62.3 percent of out-of-State passenger-car traffic in Arkansas originated in neighboring Central Plains States west of the Mississippi River; 33.9 percent came from east of the Mississippi, 24 percent being from the Southeastern States; 3.6 percent from the Mountain and Pacific States; and only 0.2 percent from foreign countries.

The data presented in table 8 pertain to out-of-State passenger vehicles remaining in the respective States more than 1 day. They are not an accurate measure of recreational travel but may be taken as an indication when studied in conjunction with other data collected in the surveys.

Twenty-five percent of the vehicles visiting Florida were on business trips and an additional 11 percent were there partly for business reasons. The average stay of vehicles visiting Florida was 29.4 days. Those visiting Michigan and Arkansas stayed, on the average, 11 days and 4.6 days, respectively. The percentage of business travel from outside the State was not determined for Michigan, and for Arkansas it was determined only for the total out-of-State travel, including visits of



less than 1 day. Of this total traffic 60.8 percent was for business reasons.

Figures from widely scattered parts of the country give evidence of the accuracy of the statement that the volume of tourist traffic tends to vary inversely with the distance between origin and destination. A count of highway traffic in Rhode Island was made in the summer of 1934. Of all cars of out-of-State registration, 75.5 percent were from other New England States, 19.4 percent from New York and Ohio, and only 5.1 percent from all other places.

Estimates by the New England Council show that about 80 percent of New England's recreational prospects are within the area east of the Mississippi and north of the Ohio River, including West Virginia, Maryland, and Delaware; and that New York City alone constitutes the primary market for tourist trips to New England.

A check of cars of out-of-State registration entering California during the first 8 months of 1935, made by



SEVERAL STATES INVITE AND ATTRACT OUT-OF-STATE TOURIST TRAFFIC BY PROVIDING FREE INFORMATION BOOTHS AND REST ROOMS ALONG THEIR HIGHWAYS. THIS STATION IS OPERATED BY THE TEXAS HIGHWAY DEPARTMENT TO DISSEMINATE INFORMATION ABOUT THE TEXAS CENTENNIAL EXPOSITION.

the department of motor vehicles, showed that 16.3 percent of these came from Washington and Oregon; 26.7 percent from the four nearby Mountain States, Arizona, Colorado, Utah, and Nevada; 10.5 percent from Texas and Oklahoma; 4.8 percent from Illinois; and 4 percent from New York. Thus, 62.3 percent of this traffic came from 10 States, 8 of which are comparatively near and directly accessible, while the other 2 are fertile fields of origin of tourist traffic.

An analysis of tourist traffic, made by the Texas State Highway Department in connection with the Texas Centennial in 1936, shows that the greatest number of tourist cars came from the neighboring States—Oklahoma, Louisiana, and New Mexico—with California in fourth place, followed by Missouri, Illinois, Tennessee, Mississippi, Indiana, New York, Michigan, and Wisconsin. In this case, also, it appears that the greatest volume of tourist traffic came from nearby States, supplemented in large measure by visitors from the Northeastern States.

#### DATA ON PURPOSE OF VISITS BY OUT-OF-STATE CARS DISCUSSED

When interpreted in a rather broad sense, "tourist" travel includes not only persons traveling for pleasure, health, or education, but also those traveling primarily for business. The business man from beyond the

borders of a given locality utilizes the same accommodations and spends his money for much the same things as the tourist who is traveling solely for pleasure. On the other hand, a considerable part of out-of-State automobile travel is made up of cars making short trips which involve no overnight stops, and which in many cases contribute but a small part of the total tourist expenditures.

Figures that throw light on the purpose of travel are found in the proportion of pleasure and business travel reported by passenger-car owners in the States of New York and Minnesota. In New York, 55.8 percent of the owners questioned reported that they were traveling in their home State on business and 44.2 percent were traveling for pleasure. Similar figures for passenger car owners in Minnesota showed that 52.7 percent were traveling on business and 47.3 percent for pleasure.

Tourist data for Florida show that a high percentage of visits to that State were made for a combination of reasons. This may have resulted from the fact that the tourist questionnaire card used in Florida contained an enumeration of a number of purposes which were not mutually exclusive as the simple designations "business" or "pleasure" are. It was accordingly necessary to make an additional analysis of these mixed purposes. In the second column of data relating to Florida in table 9 are shown the additional percentages of visiting cars which reported each of the purposes in conjunction with one or more of the others listed. Thus the occupants of 28.4 percent of all out-of-State cars were visiting Florida solely for pleasure, and those of 25.6 percent were there exclusively on business. Of the 41 percent who were there for a combination of reasons, 11.3 percent of all out-of-State cars were traveling partly on business, 18.2 percent partly to visit friends, etc.

A much higher percentage of travel for pleasure is indicated by the figures for Wisconsin in 1931, when 73.2 percent of visiting automobiles were reported as being used for pleasure, and 26.8 percent for business or other reasons. The record of purpose of travel declared by operators of out-of-State passenger cars in Arkansas, including those making trips of less than 1 day, showed a definite tendency in the opposite direction, 60.8 percent of such trips being for business and 39.2 percent for pleasure.

TABLE 9.—Purpose of visit of out-of-State passenger cars in Wisconsin, Florida, and Arkansas

| Purpose of visit              | Percentage of out-of-State cars in— |             |        |                       |
|-------------------------------|-------------------------------------|-------------|--------|-----------------------|
|                               | Wisconsin                           | Florida     |        | Arkansas <sup>1</sup> |
|                               |                                     | Exclusively | Partly |                       |
| Business.....                 | 11.3                                | 25.6        | 11.3   | 60.8                  |
| Pleasure:                     |                                     |             |        |                       |
| Vacation.....                 | 28.8                                |             |        |                       |
| Visiting friends, etc.....    | 19.7                                | 12.7        | 18     |                       |
| Scenery.....                  | 16.5                                | 10.2        | 25.1   |                       |
| Fishing.....                  | 5.2                                 | 3.6         | 18     |                       |
| Sporting events.....          |                                     | 1.9         | 9.7    |                       |
| Good roads.....               | 3.0                                 |             |        |                       |
| Total pleasure.....           | 73.2                                | 28.4        |        | 39.2                  |
| En route to other States..... | 14.0                                | .9          | 12.4   |                       |
| Other purposes.....           | 1.5                                 | 4.1         | 2.8    |                       |
| Combinations.....             |                                     | 41.0        |        |                       |

<sup>1</sup> Includes cars making trips of 1 day or less.



GLACIER NATIONAL PARK ANNUALLY ATTRACTS TOURISTS FROM FAR AND NEAR.

Photo by Hileman

Only infrequently have published statements been found in which both the number of tourist automobiles and the actual or average number of passengers were given. An estimate by the American Automobile Association placed United States automobile tourist traffic during 1928 at 44,000,000 persons traveling in 11,000,000 cars, representing an average of 4 persons to a car. The estimate of that association for 1936 showed approximately the same number of cars carrying 37,000,000 passengers, or an average of 3.4 persons per car.

A combination of other figures for various States, covering different years from 1929 to 1935 and aggregating more than 35,000,000 tourists traveling in nearly

12,000,000 automobiles, gives an average of about 3 persons to a car; but if these figures are divided according to groups by years, an average of 3.1 passengers per car is shown for the earlier years, 1929 to 1931, inclusive, and an average of 2.8 passengers per car for the later years, 1932 to 1935.

**TOURISTS MAKE LONGEST VISITS IN LOCALITIES WHERE  
AGREEABLE CLIMATE IS THE ATTRACTION**

The average number of passengers per car visiting Michigan, Wisconsin, Florida, and Arkansas, and the average length of stay of automobile tourists in each State are shown in table 10, together with estimates of the total number of tourists and tourist-days based on

those averages. The Wisconsin figures for 1931 show the highest average number of passengers per car and the second highest average length of stay, making an estimated total of 102,646,500 tourist days spent in the State during that year. In point of total tourist days spent annually in each State at the indicated time of the survey, Michigan, Florida, and Arkansas were next in importance in the order named. Although a comparatively large number of individual tourists visited the State, a smaller number of tourist days were spent in Arkansas than in any of the other three States, because the average length of visit was exceptionally short.

The American Automobile Association's estimate for 1928 indicated the length of the average automobile tourist trip as approximately 15.5 days. This is significant, in view of the fact that two weeks is probably the average vacation period of the majority of people in the United States. The entire duration of such trips is not necessarily spent in a given area, or even within a single State, but the average for all tourists becomes important as a standard of reference for the comparison of data relating to local or regional tourist traffic.

TABLE 10.—Estimated total annual automobile tourist traffic and length of stay in Michigan, Wisconsin, Florida, and Arkansas

| State and year         | Estimated number of cars annually <sup>1</sup> | Estimated number of persons |                | Average length of stay per car in days | Estimated number of person-days spent in State annually |
|------------------------|------------------------------------------------|-----------------------------|----------------|----------------------------------------|---------------------------------------------------------|
|                        |                                                | Average per car             | Total annually |                                        |                                                         |
| Michigan, 1930-31..... | 2,367,500                                      | 2.82                        | 6,676,350      | 11.0                                   | 73,439,890                                              |
| Wisconsin, 1931.....   | 1,902,500                                      | 3.27                        | 6,221,000      | 16.5                                   | 102,646,500                                             |
| Florida, 1933-34.....  | 417,960                                        | 2.71                        | 1,132,672      | 29.4                                   | 33,300,557                                              |
| Arkansas, 1934-35..... | 959,400                                        | 2.48                        | 2,379,312      | 4.6                                    | 10,944,835                                              |

<sup>1</sup> Does not include those driving through or staying less than 1 day.

The average duration of visit in a designated area is a fairly accurate index of the type of attraction that draws the tourists. In those sections where either summer or winter climate is the inviting factor, the average length of stay tends to be longer than in others where the lure is of a scenic or historical nature. In one case the tourist comes to reside in the locality for a period, whereas in the other he travels only to see the place and then to pass on. The mild winter climates of both southern California and Florida make these two localities competitors for tourists who wish to escape cold weather in other parts of the country. The average length of visit to southern California in 1931 was 38.3 days, with tourists remaining about three times as long in winter as in summer. Visitors remained in Florida an average of 29.4 days in 1934-35. With the further extension of the Inter-American Highway, it is possible that Mexico and Central America will also enter this field of competition for winter-tourist traffic.

Visitors to northern and central California made an average stay of 11.5 days, but the average visit in the late spring, summer, and early fall, was five times as long as during the other 6 months of the year. In Colorado the average tourist visit was 14.8 days, with the length of stay during June, July, and August, averaging 20 days, and during the rest of the year 8 days. Visitors to Michigan and Wisconsin stayed an average of 11 and 16.5 days, respectively, these periods approximating those for northern and central California and Colorado. It would seem that the tourist appeal of these four States depends in part on climate and in part on scenic attraction.

In contrast with these, the average tourist visit of 4.6 days in Arkansas at the time of the traffic survey, and of 3 days in Arizona in 1936, indicates the transient nature of tourist traffic in these States. It was also reported that of the one and a quarter million tourists estimated to have visited Vermont in 1935, the majority were merely passing through the State.

#### OUT-OF-STATE CARS IN 11 WESTERN STATES TRAVELED 232 MILES DAILY

Another index of the more or less transient nature of tourist traffic is found in figures of average daily travel by out-of-State passenger cars in various localities. Although no figures are available in the survey of traffic in the 11 Western States regarding the length of stay of out-of-State passenger cars, the average daily travel by such cars in the respective States is shown. The average for such traffic in all 11 States was 232 miles per day, varying between a high of 247 miles a day in California and a low of 189 miles a day in Washington. It should be remembered, however, that the broad extent of land area and the greater distances between centers of population and between points of interest in the more sparsely populated Western States would account for a considerably higher average daily car mileage in those sections, in contrast with similar figures for cars traveling in the Eastern States.

Comparable basic figures and estimates of total annual travel by out-of-State passenger cars in Michigan, Wisconsin, and Florida, are shown in table 11. Although generalizations based on as few as three States are inadvisable, these figures show certain relationships that appear to be reasonable. The average daily travel by out-of-State cars was greatest in Michigan where the average length of stay was least, and least in Florida where the duration of visit was longest, suggesting that in those localities where tourist traffic is of a more permanent nature the average daily mileage of travel is less, and vice versa.

TABLE 11.—Estimated total annual number of and travel by out-of-State passenger cars visiting Michigan, Wisconsin, and Florida

| State and year         | Estimated number of cars annually <sup>1</sup> | Average number of days per car | Total number of car-days annually | Average travel |           | Estimated total travel annually |
|------------------------|------------------------------------------------|--------------------------------|-----------------------------------|----------------|-----------|---------------------------------|
|                        |                                                |                                |                                   | Per day        | Per trip  |                                 |
| Michigan, 1930-31..... | 2,367,500                                      | 11.0                           | 26,042,500                        | Miles 74.2     | Miles 816 | Car-miles 1,932,353,590         |
| Wisconsin, 1931.....   | 1,902,500                                      | 16.5                           | 31,391,250                        | 35.6           | 587       | 1,117,528,500                   |
| Florida, 1933-34.....  | 417,960                                        | 29.4                           | 12,288,024                        | 22.0           | 647       | 270,336,528                     |

<sup>1</sup> Does not include those driving through or staying less than 1 day.

Not very many years ago, hotels and regular lodging houses were the only places where automobile tourists could find lodging. It has been estimated that approximately 73 percent of all automobile tourists in the United States stopped at hotels as recently as 1928 and 1929, the remaining 27 percent utilizing other types of accommodation. A similar estimate for New England in 1929 indicated that 70 percent of tourists visiting that area patronized hotels and 30 percent patronized all other types of accommodation.

But during recent years, both the number and variety of types of accommodation for automobile tourists have increased, along with the development of other facilities for their convenience. Private homes have been opened to tourists; tourist cabins and camp sites have



been established along the principal highways; and in those areas where there is a considerable amount of tourist traffic, cottages and apartments catering especially to tourists have been equipped. These developments have effected great changes in the distribution of tourist patronage of various types of accommodation.

The latest addition to the list of available accommodations for automobile tourists is the house trailer. The improvement and relatively widespread use of this newest feature of tourist travel have caused repercussions in various fields. Transient and semipermanent trailer camps have been established in many tourist areas, while such camps have been prohibited at some of the more exclusive resorts; and taxation experts have been busy with the problem of devising ways and means of assessing and collecting taxes on these rolling homes. Within the past year house trailers have increased amazingly in both number and variety, so that they may be expected to constitute an important factor in future studies of tourist traffic.

#### CLASSES OF ACCOMMODATION USED BY TOURISTS IN THREE STATES LISTED

Definite information regarding the type of accommodation used was obtained in connection with the Michigan, Florida, and Arkansas traffic surveys. The estimated number of passenger cars, tourists, and tourist-days for each of these States, classified according to type of accommodation, are shown in table 12. The distribution of the total number of tourist-days, by type of accommodation, is also shown graphically in figure 3.

The Michigan traffic survey shows that passengers of 31.1 percent of out-of-State cars making overnight stops in that State stayed at hotels; 10.1 percent patronized tourist camps; 35.4 percent were visiting friends;

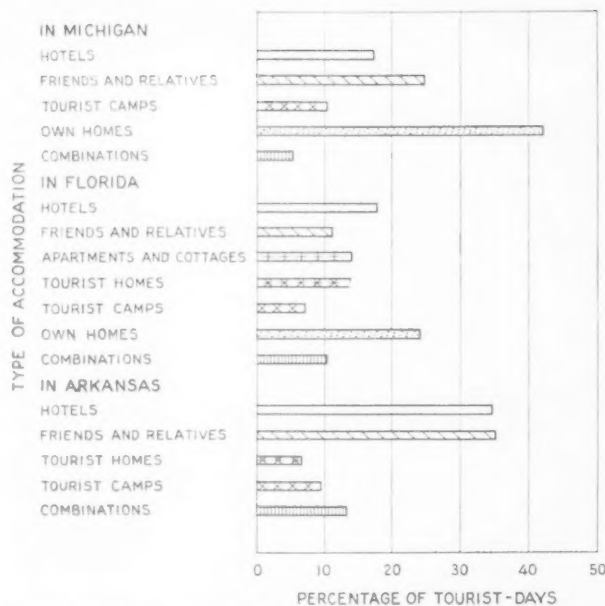


FIGURE 3.—PERCENTAGE DISTRIBUTION OF NUMBER OF TOURIST DAYS SPENT IN MICHIGAN, FLORIDA, AND ARKANSAS, BY TYPE OF ACCOMMODATION.

19.1 percent had their own summer homes; while 4.3 percent used various other types of accommodation. Passengers of a considerable proportion of cars visiting Florida stopped at hotels, and a much smaller proportion were visiting friends or staying in their own homes. A great variety of accommodations for tourists was reported in Florida, where apartments and cottages, tourist homes, and tourist camps took care of the passengers of more than 20 percent of all tourist cars.

TABLE 12.—Estimated annual number of out-of-State passenger cars, number of tourists, and duration of stay in Michigan, Florida, and Arkansas, by type of accommodation<sup>1</sup>

| Type of accommodation   | Passenger cars |                     | Tourists        |           |                     | Duration of stay |                       |                     |
|-------------------------|----------------|---------------------|-----------------|-----------|---------------------|------------------|-----------------------|---------------------|
|                         | Number         | Percentage of total | Persons per car | Number    | Percentage of total | Days per person  | Number of person-days | Percentage of total |
| <b>IN MICHIGAN</b>      |                |                     |                 |           |                     |                  |                       |                     |
| Hotels                  | 735,000        | 31.1                | 2.27            | 1,668,450 | 25.0                | 8.2              | 13,681,590            | 17.4                |
| Friends and relatives   | 837,500        | 35.4                | 3.10            | 2,596,250 | 38.8                | 7.5              | 19,471,875            | 24.8                |
| Apartments and cottages |                |                     |                 |           |                     |                  |                       |                     |
| Tourist homes           | 240,000        | 10.1                | 3.17            | 760,800   | 11.4                | 10.6             | 8,064,480             | 10.3                |
| Tourist camps           | 452,500        | 19.1                | 3.05            | 1,380,125 | 20.6                | 24.0             | 33,123,000            | 42.2                |
| Own homes               | 102,500        | 4.3                 | 2.74            | 280,850   | 4.2                 | 14.7             | 4,128,495             | 5.3                 |
| Combinations            |                |                     |                 |           |                     |                  |                       |                     |
| All types               | 2,367,500      | 100.0               | 2.82            | 6,686,475 | 100.0               | 11.7             | 78,469,140            | 100.0               |
| <b>IN FLORIDA</b>       |                |                     |                 |           |                     |                  |                       |                     |
| Hotels                  | 162,500        | 38.9                | 2.28            | 370,705   | 32.7                | 19.5             | 7,228,748             | 18.1                |
| Friends and relatives   | 87,770         | 21.0                | 3.09            | 271,209   | 23.9                | 16.1             | 4,366,465             | 10.9                |
| Apartments and cottages | 22,150         | 5.3                 | 2.95            | 65,342    | 5.8                 | 87.7             | 5,730,493             | 14.4                |
| Tourist homes           | 41,380         | 9.9                 | 2.83            | 117,105   | 10.3                | 48.2             | 5,644,461             | 14.2                |
| Tourist camps           | 26,330         | 6.3                 | 3.28            | 86,362    | 7.6                 | 33.5             | 2,893,127             | 7.3                 |
| Own homes               | 32,180         | 7.7                 | 2.84            | 91,391    | 8.1                 | 106.3            | 9,714,863             | 24.4                |
| Combinations            | 45,560         | 10.9                | 2.87            | 130,757   | 11.6                | 32.6             | 4,262,678             | 10.7                |
| All types               | 417,960        | 100.0               | 2.71            | 1,132,871 | 100.0               | 25.2             | 39,840,835            | 100.0               |
| <b>IN ARKANSAS</b>      |                |                     |                 |           |                     |                  |                       |                     |
| Hotels                  | 474,500        | 49.5                | 1.77            | 839,865   | 35.9                | 6.2              | 5,207,163             | 34.8                |
| Friends and relatives   | 264,100        | 27.5                | 3.17            | 837,197   | 35.8                | 6.3              | 5,274,341             | 35.2                |
| Apartments and cottages |                |                     |                 |           |                     |                  |                       |                     |
| Tourist homes           | 32,800         | 3.4                 | 2.84            | 93,152    | 4.0                 | 11.0             | 1,024,672             | 6.8                 |
| Tourist camps           | 113,400        | 11.8                | 3.20            | 362,880   | 15.5                | 3.9              | 1,415,232             | 9.5                 |
| Own homes               |                |                     |                 |           |                     |                  |                       |                     |
| Combinations            | 74,000         | 7.8                 | 2.74            | 204,404   | 8.8                 | 10.0             | 2,044,040             | 13.7                |
| All types               | 959,400        | 100.0               | 2.44            | 2,337,498 | 100.0               | 6.4              | 14,965,448            | 100.0               |

<sup>1</sup> Not including those driving through or staying less than 1 day.

In Arkansas the passengers of 49.5 percent of out-of-State cars were reported as stopping at hotels; 27.5 percent stayed with friends; 11.8 percent stopped in tourist camps; and 3.4 percent patronized tourist homes. The high percentage of hotel patronage in this State gives further emphasis to the fact, already pointed out, that an exceptionally large proportion of out-of-State cars were in Arkansas on business.

In each of these three States cars patronizing hotels had the smallest average number of passengers, while cars most heavily laden with passengers were visiting friends or stopping at tourist camps. The average number of passengers reported for cars stopping at tourist homes in both Florida and Arkansas was approximately the same.

Twenty-five percent of the individual automobile tourists patronized hotels in Michigan, 32.7 percent in



CAMP TRAILERS LIKE THIS ONE WERE THE FORERUNNERS OF THE HOUSE TRAILERS, WHOSE NUMBERS HAVE INCREASED RAPIDLY DURING THE PAST SEVERAL YEARS.

Florida, and 35.9 percent in Arkansas. In Michigan nearly 6 out of 10 visitors stayed with friends or in their own homes, but in Florida only about 1 out of 3 was so provided for. Tourist homes were more popular than tourist camps in Florida, while in Arkansas the reverse was true.

Visitors who lived in their own summer or winter homes in both Michigan and Florida, stayed a much longer time than tourists using other types of accommodation. Those who occupied rented apartments or cottages in Florida also made comparatively long visits. The average length of stay in hotels or with friends in both Michigan and Arkansas was about 1 week, while in Florida an average stay of between 2 and 3 weeks was reported for each of these groups.

#### DISTRIBUTION OF TOURIST EXPENDITURES DISCUSSED

The patronage accorded each type of accommodation in these three States is shown in the last two columns of table 12. In Michigan, 67 percent of the total number of tourist days was spent in the visitors' own homes or with friends, and furnished no direct business to those providing transient accommodations for tourists. Nevertheless, Michigan hotels received more than 13,681,000 person-days of patronage by automobile tourists, representing a larger volume of such business than the combined total for both Florida and Arkansas. In Florida, 35 percent of all tourist days was spent in the visitors' own homes or with friends and relations, and in Arkansas, which is not important as a summer home section, 35 percent of

the total number of tourist days was spent with friends and relations. In Michigan and Florida, 17 and 18 percent, respectively, of all tourist days were spent in hotels; but in Arkansas, where a large percentage of out-of-State cars making business trips was recorded, hotels received 35 percent of all such patronage. The many different kinds of accommodation offered the tourist in Florida probably accounts in large measure for the more even distribution of actual tourist time among them.

Estimates of the distribution of American tourist expenditures throughout the United States have been made from time to time. In one of these estimates the allocation was as follows: Food, 21 percent; lodging, 20 percent; transportation, 20 percent; retail stores, 25 percent; recreation and amusement, 8 percent; and miscellaneous items, 6 percent. This estimate relates to expenditures by all classes of tourists, regardless of the mode of transportation. Nevertheless, it seems likely that, for the country as a whole, approximately the same distribution of expenditures by automobile tourists would be found, except that comparatively lower transportation cost might result in apparently higher percentages for other items.

The distribution of expenditures in individual States, however, may be expected to show considerable variation from the general or national average. The distribution listed in the preceding paragraph was endorsed by the New England Council as being representative of expenditures by all classes of tourists in the New England States. But an estimate by Californians, Inc., showed a much higher proportion spent for food and lodging by all classes of tourists in northern and central California in 1935 with relatively smaller amounts spent for clothing and general merchandise. The percentages in this distribution were: Food, 36.9 percent; lodging, 28.2 percent; gas, oil, and car expenses, 10.1 percent; local transportation, 5.3 percent; clothing, 5.5 percent; personal expenditures, 4.7 percent; recreation, 3.7 percent; souvenirs, 3 percent; and camera supplies, 2.6 percent.

The foregoing estimates have been based on the consideration of what the tourist received for his money. Another type of distribution takes into account the dissemination of tourist expenditures among the various business enterprises of the community in which the money was spent. Such an analysis of 1930 tourist expenditures in Maine was made by the Maine Development Commission, with the following resultant distribution: Hotels and sporting camps, 16 percent; rooms, overnight camps, and eating places, 7 percent; boys' and girls' camps, 5 percent; groceries, 11 percent; all other stores, 10 percent; garages and filling stations, 9 percent; construction work, 7 percent; amusements and sports, 6 percent; utilities and transportation, 4 percent; insurance, 3 percent; farm produce and fuel, 3 percent; direct employment, 2 percent; antiques and gifts, 2 percent; and all other items, 15 percent.

A more recent estimate of the distribution among various classes of business of approximately 5 billion dollars spent by the American tourist in the United States in 1936 was made by Roger Babson, a nationally recognized statistician. This estimate shows that retail merchants received 25 percent; restaurants and cafes, 21 percent; hotels and camps, 17 percent; gasoline stations, 12 percent; theaters and amusements, 9 percent; transportation (rail, bus, etc.), 7 percent; confectionery stores, 5 percent; and other kinds of business, 4 percent.

**TYPE OF ACCOMMODATION PATRONIZED BY TOURISTS AFFECTED DISTRIBUTION OF EXPENDITURES FOR FOOD, LODGING, TRAVEL, ETC.**

Estimates of total expenditures by automobile tourists were made in connection with the highway traffic surveys in Michigan and Florida. These figures are presented in table 13, distributed according to type of accommodation patronized. In each State the expenditures made by persons stopping at hotels were approximately the same as the expenditures by those living in their own summer or winter homes, but in Michigan each of these represented a greater part of the total than in Florida.

The percentage of total expenditures made by tourists visiting friends and relatives was also much greater in Michigan than in Florida, because both the number and the average daily expenditure by this class of tourists were greater in Michigan. On the other hand, it should be observed that a greater variety of accommodations for tourists was listed in Florida, where tourists patronizing furnished apartments and cottages, tourist homes, tourist camps, and various combinations, made almost one-third of the total tourist expenditures, in contrast with about 15 percent made by those using tourist camps and miscellaneous accommodations in Michigan. In both States, tourists making no overnight stops were credited with only 0.4 percent of the total tourist expenditures.

TABLE 13.—Distribution of estimated total annual expenditures by automobile tourists in Michigan and Florida, by type of accommodation

| Type of accommodation        | Estimated annual expenditures |                     |                         |                     |
|------------------------------|-------------------------------|---------------------|-------------------------|---------------------|
|                              | In Michigan <sup>1</sup>      |                     | In Florida <sup>2</sup> |                     |
|                              | Amount                        | Percentage of total | Amount                  | Percentage of total |
| Hotels.....                  | \$98,400,000                  | 35.9                | \$27,932,000            | 30.9                |
| Friends and relatives.....   | 33,700,000                    | 12.3                | 5,257,000               | 5.8                 |
| Apartments and cottages..... |                               |                     | 9,033,000               | 10.0                |
| Tourist homes.....           |                               |                     | 8,896,000               | 9.8                 |
| Tourist camps.....           | 25,600,000                    | 9.3                 | 2,320,000               | 2.6                 |
| Own homes.....               | 99,000,000                    | 36.1                | 27,947,000              | 30.9                |
| Combinations.....            | 16,300,000                    | 6.0                 | 8,704,000               | 9.6                 |
| Through traffic.....         | 1,100,000                     | .4                  | 369,000                 | .4                  |
| All types.....               | 274,100,000                   | 100.0               | 90,458,000              | 100.0               |

<sup>1</sup> For 1930-31.

<sup>2</sup> For 1933-34.

On the basis of unit cost of designated items of expenditure by tourists patronizing various types of accommodation, the distribution of expenditures of each class, as shown in table 14, has been derived. This distribution is also shown graphically in figure 4. For all tourists the proportional cost of food and lodging was higher in Florida, and the percentages for car operation and miscellaneous expenditures were relatively greater in Michigan. Detailed analysis would reveal many causes of this difference in distribution of expenditures in these two States, but the most obvious are probably the greater average length of stay in Florida, and the greater average daily car mileage in Michigan.

In each State the highest relative cost of lodging was paid by those in their own homes; the estimated daily cost of this item in Michigan was based on an average rental value of summer homes during the 100-day tourist season, and in Florida on an average annual

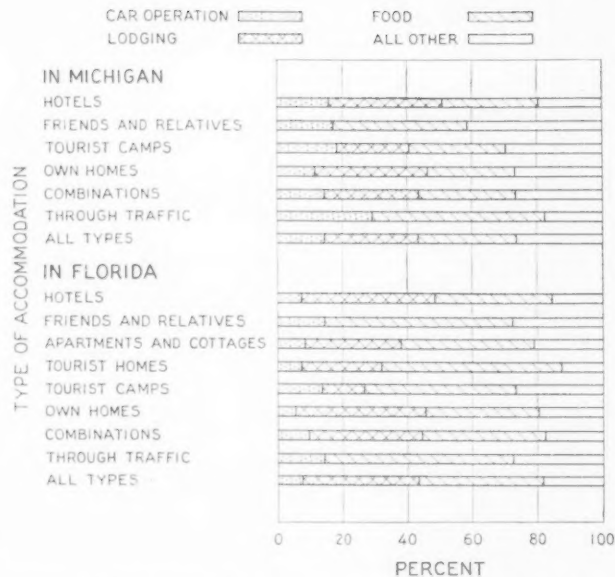


FIGURE 4.—PERCENTAGE DISTRIBUTION OF ESTIMATED ANNUAL EXPENDITURES BY AUTOMOBILE TOURISTS IN MICHIGAN AND FLORIDA, BY TYPE OF ACCOMMODATION.

cost of operating and carrying charges distributed over a season of 160 days. In both States the relative cost of hotel accommodations was only slightly lower than that of operating private homes, and the lowest proportional cost of lodging was paid in tourist camps. Because no allowance was made for cost of lodging for groups of tourists visiting friends, or making no overnight stops in the State, the relative part of total expenditures spent for food was greatest for these two classes.

TABLE 14.—Distribution of estimated expenditures by automobile tourists patronizing various types of accommodation in Michigan and Florida

| Type of accommodation        | Percentage of estimated expenditures for— |         |      |           |       |
|------------------------------|-------------------------------------------|---------|------|-----------|-------|
|                              | Car operation                             | Lodging | Food | All other | Total |
| IN MICHIGAN                  |                                           |         |      |           |       |
| Hotels.....                  | 15.7                                      | 35.3    | 29.4 | 19.6      | 84.3  |
| Friends and relatives.....   | 17.6                                      | 41.2    | 41.2 | 82.4      |       |
| Apartments and cottages..... |                                           |         |      |           |       |
| Tourist homes.....           | 18.4                                      | 22.2    | 29.7 | 29.7      | 81.6  |
| Own homes.....               | 11.3                                      | 35.5    | 26.6 | 26.6      | 88.7  |
| Combinations.....            | 14.5                                      | 29.4    | 29.9 | 26.2      | 85.5  |
| Through traffic.....         | 29.3                                      | 53.0    | 17.7 | 70.7      |       |
| All types.....               | 14.6                                      | 29.3    | 30.0 | 26.1      | 85.4  |
| IN FLORIDA                   |                                           |         |      |           |       |
| Hotels.....                  | 7.3                                       | 41.5    | 36.1 | 15.1      | 92.7  |
| Friends and relatives.....   | 14.5                                      | 57.8    | 27.7 | 85.5      |       |
| Apartments and cottages..... | 8.6                                       | 29.8    | 40.8 | 20.8      | 91.4  |
| Tourist homes.....           | 7.2                                       | 25.1    | 55.1 | 12.6      | 92.8  |
| Tourist camps.....           | 13.7                                      | 13.3    | 46.4 | 26.6      | 86.3  |
| Own homes.....               | 5.1                                       | 45.9    | 29.3 | 19.7      | 94.9  |
| Combinations.....            | 9.2                                       | 35.7    | 37.3 | 17.8      | 90.8  |
| Through traffic.....         | 14.2                                      | 58.7    | 27.1 | 85.8      |       |
| All types.....               | 7.5                                       | 36.2    | 38.1 | 18.2      | 92.5  |

From these figures it may be seen that the type of accommodation patronized by tourists has considerable effect upon the relative distribution of expenditures made by each class. On the other hand, the reasonable degree of comparability found between the distribution





ADEQUATE PARKING AREAS, SUCH AS THIS ONE AT MOUNT VERNON, ARE A NECESSARY ACCOMMODATION FOR MOTOR TOURISTS AT HISTORICAL AND SCENIC ATTRACTIONS.

of expenditures by automobile tourists in Michigan and Florida, and by all classes of tourists in northern and central California, previously cited, bears out the assumption that the nature of expenditures made by tourists is only slightly affected by the type of transportation used.

Although available information relating to tourist travel by automobile within the United States is, as yet, fragmentary and so dissimilar as to make accurate comparison or summary impossible, the general review of such information may suggest a standard by which greater accuracy and uniformity can be obtained in the future. Knowledge of the actual number of and mileage traveled by out-of-State automobiles to be expected in a given area at a certain time is of value to officials who plan local programs of highway development and maintenance. Facts regarding the origin and distribution of patronage of automobile tourists visiting their districts are of interest to organizations and business enterprises, especially to those that cater directly to tourist trade. From the point of view of the tourist himself, analysis of the nature of accommodations for travelers, the daily total and per-capita costs of various items, and the distribution of expenditures on the basis of the type of accommodation used, are of particular interest.

If it were possible to obtain, from a large number of automobile tourists visiting various points of interest throughout the country, exact information regarding each of the points touched upon in the preceding discussion, the results would undoubtedly be of great value from both a local and a National point of view.

#### BIBLIOGRAPHY ON HIGHWAY LIGHTING AVAILABLE

A bibliography on highway lighting, covering primarily the years 1913 to 1936 and accenting more recent developments, has just been published by the Bureau of Public Roads of the United States Department of Agriculture as Miscellaneous Publication No. 279.

The references are arranged according to the time of publication under each of these years, with a collected author index at the end. Articles in French, German, Spanish, and other languages, as well as in English, are listed.

Highway engineers and city officials will find this bibliography a guide to literature on the latest developments in lighting streets and highways, bridges, viaducts, tunnels, and causeways. For example, material is available on new types of lamps, and on the photo-electric cell which switches the system on and off,

depending upon the natural light available, as well as on the French system of equalizing tunnel illumination with the outer light at all times.

This annotated bibliography may be obtained free from the United States Department of Agriculture, Washington, D. C.

#### INDEX TO PUBLIC ROADS, VOLUME 17, TO BE AVAILABLE SOON

The index to volume 17 of PUBLIC ROADS is now being printed and will be available soon. In addition to the index, a chronological list of articles and a list of authors are given. The index will be sent free to subscribers to PUBLIC ROADS requesting it. Requests should be addressed to the Bureau of Public Roads, United States Department of Agriculture, Washington, D. C.

## EFFECT OF HIGHWAY DESIGN ON VEHICLE SPEED AND FUEL CONSUMPTION STUDIED IN OREGON

A publication reporting experiments performed to measure the effect of highway design on vehicle speed and fuel consumption has recently been issued by the Oregon State Highway Commission as Highway Department Technical Bulletin No. 5. The report was prepared under the supervision of Mr. John Beakey, Traffic Engineer.

The primary purpose of the investigation was to determine the effect of grades on fuel requirements. However, before actual tests could be made it was found necessary to broaden the scope of the work to include tests on curvature and surface types in order to eliminate, as much as possible, those variables.

Since motor fuel consumption makes up a large part of the total vehicle operating cost, the importance of better understanding factors affecting this variable is apparent. Among these factors, speed and gradient are by far the most important.

The report presents the results of tests made over a period of a year and a half on passenger cars and heavier equipment operating under both controlled and actual operating conditions. Only a limited number of vehicles were tested, but the results serve to point the way toward a more accurate analysis of the effect of highway design on vehicular operating costs.

The conclusions reached in this study are as follows:

#### A. Relative to Level Road-Grade Equivalents.

1. The potential energy theory heretofore applied to grade reduction problems fails to furnish a true method for the determination of level road equivalents since in that method no consideration is given to the dissipation of stored energy when descending grades.

2. The true measure of level road rise equivalents must take into consideration both up and down grade operation, and should be based upon total operating costs rather than upon fuel costs alone. When these factors are duly considered, the results of these tests indicate the following general relationships for motor-vehicle equipment in current use.

(a) For modern passenger cars the level road equivalent of 1 foot of rise varies from 2.28 feet to a value less than 1 foot and is therefore, in general, negligible in grade reduction problems.

(b) For heavier equipment the level road equivalents are considerably larger, and, in general, increase with the percent of grade largely because of the necessity for shifting gears on grades, a necessity which does not exist in the case of passenger cars for the grades investigated. As an example, with a truck weighing 45,000 pounds gross the level road equivalents determined by these tests were as follows:

| Percent of grade: | Level road equivalent of<br>1 foot of rise (feet) |
|-------------------|---------------------------------------------------|
| 1 percent.....    | 2.20                                              |
| 2 percent.....    | 4.45                                              |
| 3 percent.....    | 6.65                                              |
| 4 percent.....    | 8.90                                              |
| 5 percent.....    | 12.00                                             |
| 6 percent.....    | 15.20                                             |

(c) In general, the level road rise equivalents for automotive vehicles in any weight class can be determined from the formulas and curves given in the body of this report, once the fuel consumption on grades and on the level are known. These fuel consumption values, for heavy equipment, may be estimated very closely from the following formulas which are based upon the results of this investigation:

|                          |                                 |
|--------------------------|---------------------------------|
| For level grade.....     | C = 0.0001283W <sup>0.712</sup> |
| For 1 percent grade..... | C = 0.0001179W <sup>0.723</sup> |
| For 2 percent grade..... | C = 0.0000954W <sup>0.750</sup> |
| For 3 percent grade..... | C = 0.0000731W <sup>0.785</sup> |
| For 4 percent grade..... | C = 0.0000542W <sup>0.825</sup> |
| For 5 percent grade..... | C = 0.0000373W <sup>0.876</sup> |
| For 6 percent grade..... | C = 0.0000260W <sup>0.928</sup> |

Wherein "C" is the consumption of fuel in gallons per mile, and "W" is the gross weight of the vehicle in pounds.

3. The above level road equivalents take into consideration both ascending and descending grade movements. In those rather unusual cases where it becomes necessary to consider the level road equivalent of 1 foot of rise for ascending grade movement only, the tables and formulas given in the body of this report furnish a basis for the determination of such equivalents.

#### B. Relative to Fuel Consumption (Light Vehicles).

4. For the average modern passenger car, fuel consumption at constant speed on ascending grades up to 6 percent increases at a uniform rate with each percent increase in grade.

5. For the average modern passenger car, fuel consumption at constant speed on descending grades up to 6 percent is, at the lower speeds, a time function depending upon the idling adjustment of the given vehicle. At all speeds at which throttle opening is required, fuel consumption decreases at a nearly uniform rate with each percent increase in descending grade.

6. For the average passenger car, fuel consumption at constant speed for composite grades (i. e., both ascending and descending) increases with each percent increase in grade, the rate of increase being somewhat greater for the steeper grades. The increase in fuel consumption for this class of vehicle, however, is generally so small as to be negligible unless traffic is abnormally dense, and for this reason grade reductions below 6 percent can generally be justified only when there is or will be a considerable volume of heavy truck traffic.

#### C. Relative to Fuel Consumption (Heavy Vehicles).

7. For heavy automotive equipment, fuel consumption is definitely a function of the percent or rate of grade because of the characteristic speed and gear employed on each grade.

8. Descending grade fuel consumption for heavy vehicles varies between wide limits due to the effect on speed of grade, length, curvature and weather conditions.

9. In general, fuel consumption for heavy equipment increases with each percent increase in grade; however, no material saving is possible through the reduction of grades of 2 percent or less. This is true of gasoline powered trucks, and results from a limited number of Diesel powered trucks indicate that savings from grade reductions will be proportionally the same.

10. In general, fuel requirements on a section comprising several different grades will be the same (except for the effect of vertical curves, which is small) as that on the same length of constant grade of the same average rate, provided that conditions of constant speed and uniform fuel mixture are maintained.

11. The time savings obtained from grade reduction in the case of grades up to 6 percent is of no material importance to light passenger vehicles but does affect truck operation on grades steeper than 2 percent. The relation between speed and gross weight for the six heavy vehicles included in these tests operating on grades may be expressed as follows:

For ascending grades:

$$\text{Speed (m. p. h.)} = 60 - 0.5W - 4.33G.$$

For composite grades (ascending and descending):

$$\text{Speed (m. p. h.)} = 60 - 0.5W - 1.5G.$$

Where

W = The gross weight of the vehicle in thousands of pounds.

G = The percent of grade.

#### D. Relative to Road Design.

12. Power requirements and consequent fuel consumption for light vehicles will not be materially affected by road curvature of 6° or less if such curvature is properly superelevated. No tests were made on spiral curves such as are now standard for trunk highways in Oregon.

13. The difference in efficiency between a concrete road surface and a modern bituminous type is very slight when considered from a fuel consumption standpoint.

14. The above conclusions have dealt with conditions wherein the effective rise and fall has been decreased. Grade reductions in which the effective rise and fall is not decreased will result in no material savings in fuel consumption for light passenger cars, but will effect some saving in the case of heavy automotive units.

#### E. Relative to Diesel Powered Trucks.

15. Results from a survey comprising 100 vehicles in actual service show Diesel fuel consumption, expressed in gallons per mile, to be 40 percent less than gasoline in relatively level country and 45 percent less in mountainous country.

16. Reduction of those grades that will result in savings of fuel on both heavy and light equipment will

yield greater fuel savings, on a ton-mile basis, with heavy than with light equipment. However, the resulting savings in cost of operation per ton-mile may be less on Diesel powered heavy equipment than on passenger cars due to the lower cost of fuel.

#### F. Relative to Automotive Equipment in General.

17. Passenger car operating costs are materially affected by carburetor and timing adjustments.

18. Fuel requirements even for a limited number of vehicles will show a wide variation depending upon individual characteristics.

19. Gasoline consumption will generally vary directly as power output over a considerable range, but air-fuel ratio may materially affect the linearity.

20. Any drop in air-fuel ratio, particularly noticeable at high and at low power requirements at constant speed, materially increases fuel consumption.

21. The exhaust gas analyzer used in these tests proved indispensable for duplication of results and for confirmation on the accuracy of the results of gasoline consumption tests on light vehicles.

22. The overall thermal efficiency of the average passenger car increased with an increase in engine load produced, either by an increase in speed or by operation on steep grades, or both. The peak efficiency was attained at a relatively high speed on a steep grade. Engine characteristics may cause the efficiency to drop when the engine is overloaded by speed and grade.

23. Heavy motor vehicle operating characteristics on grades vary considerably, depending on the engine type, characteristics, and motive power per ton of gross vehicle weight.

24. Heavy motor vehicles operating at practically constant engine speed have definite characteristic road speeds depending on the percent of the grade and the power per ton.

25. It is believed that the results of tests on heavy equipment conducted under actual operating conditions and modified by the methods of operation give more representative information than tests conducted at constant speed in each gear.



## STATUS OF FEDERAL-AID HIGHWAY PROJECTS

AS OF JULY 31, 1937

| STATE                | COMPLETED DURING CURRENT FISCAL YEAR |             |         | UNDER CONSTRUCTION      |             |         | APPROVED FOR CONSTRUCTION |              |         | BALANCE OF<br>FUNDING AVAILABLE<br>FOR NEW<br>PROJECTS |
|----------------------|--------------------------------------|-------------|---------|-------------------------|-------------|---------|---------------------------|--------------|---------|--------------------------------------------------------|
|                      | Estimated<br>Total Cost              | Federal Aid | Miles   | Estimated<br>Total Cost | Federal Aid | Miles   | Estimated<br>Total Cost   | Federal Aid  | Miles   |                                                        |
| Alabama              | \$ 6,200                             | \$ 4,260    |         | \$ 1,354,601            | \$ 677,300  | 58.5    | \$ 4,029,960              | \$ 2,014,975 | 177.3   | \$ 5,154,905                                           |
| Arizona              | 146,390                              | 146,390     | 7.3     | 1,516,256               | 1,074,250   | 51.7    | 552,620                   | 337,105      | 20.4    | 1,658,924                                              |
| Arkansas             |                                      |             |         | 3,629,617               | 3,624,220   | 219.7   | 305,722                   | 305,081      | 32.4    | 2,322,961                                              |
| California           | 2,255,703                            | 1,293,618   | 61.5    | 6,473,132               | 3,418,794   | 94.2    | 2,057,326                 | 1,115,649    | 49.4    | 3,044,825                                              |
| Colorado             | 638,143                              | 356,958     | 19.3    | 2,874,538               | 1,597,574   | 102.0   | 124,133                   | 64,552       | 1.5     | 2,344,136                                              |
| Connecticut          |                                      |             |         | 745,158                 | 370,176     | 8.7     | 277,140                   | 130,933      | 1.4     | 1,504,408                                              |
| Delaware             |                                      |             |         | 415,500                 | 207,664     | 12.3    | 340,717                   | 168,337      | 22.0    | 1,107,687                                              |
| Florida              | 134,650                              | 67,320      | 6.6     | 3,328,572               | 1,164,285   | 57.3    | 315,470                   | 157,735      | 3.6     | 3,021,560                                              |
| Georgia              | 490,777                              |             |         | 3,435,437               | 1,717,703   | 175.6   | 2,068,335                 | 1,034,167    | 71.8    | 5,665,575                                              |
| Idaho                | 70,292                               | 245,388     | 26.9    | 3,435,437               | 1,717,703   | 175.6   | 2,068,335                 | 1,034,167    | 71.8    | 1,388,441                                              |
| Illinois             | 772,315                              | 41,895      | 3.6     | 2,021,905               | 1,208,229   | 134.4   | 948,512                   | 366,981      | 36.3    | 3,018,562                                              |
| Indiana              | 812,708                              | 351,683     | 28.5    | 10,437,547              | 5,203,482   | 306.5   | 4,597,943                 | 2,296,110    | 106.4   | 2,281,486                                              |
| Iowa                 |                                      | 406,299     | 21.4    | 5,852,418               | 2,926,204   | 155.9   | 1,455,682                 | 727,841      | 27.4    | 2,078,549                                              |
| Kansas               |                                      |             |         | 6,236,724               | 2,780,672   | 187.3   | 2,614,190                 | 1,235,130    | 76.0    | 3,432,448                                              |
| Kentucky             | 734,294                              | 340,700     | 34.0    | 5,527,787               | 2,748,734   | 220.3   | 1,903,220                 | 951,603      | 107.7   | 2,842,041                                              |
| Louisiana            | 435,792                              | 217,896     | 10.8    | 3,178,401               | 1,539,201   | 74.5    | 2,116,630                 | 1,058,425    | 110.8   | 2,469,714                                              |
| Maine                | 30,438                               | 15,219      | 1.3     | 9,430,396               | 1,291,274   | 26.2    | 946,050                   | 401,952      | 39.5    | 594,958                                                |
| Maryland             | 236,160                              | 118,080     | 7.0     | 1,678,356               | 839,178     | 47.5    | 1,453,005                 | 726,502      | 32.1    | 2,036,129                                              |
| Massachusetts        | 180,456                              | 90,228      | 2.1     | 1,439,650               | 719,792     | 21.7    | 497,318                   | 248,659      | 7.4     | 2,346,493                                              |
| Michigan             | 1,842,300                            | 921,150     | 59.7    | 4,434,456               | 2,217,228   | 20.3    | 1,049,224                 | 524,611      | 4.5     | 871,605                                                |
| Minnesota            | 752,420                              | 376,210     | 41.1    | 5,961,012               | 2,980,506   | 138.0   | 4,067,251                 | 1,955,900    | 80.9    | 2,715,136                                              |
| Mississippi          | 129,800                              | 64,900      | 4.1     | 3,303,003               | 1,583,382   | 146.2   | 2,685,158                 | 1,342,579    | 75.0    | 3,570,094                                              |
| Missouri             | 1,814,658                            | 904,948     | 52.9    | 7,119,277               | 3,388,443   | 339.0   | 2,365,780                 | 1,182,130    | 100.4   | 2,892,528                                              |
| Montana              | 1,297,870                            | 727,532     | 90.1    | 2,915,147               | 1,635,509   | 196.6   | 3,781,232                 | 1,587,033    | 170.2   | 2,759,860                                              |
| Nebraska             | 444,831                              | 222,416     | 56.9    | 2,915,147               | 1,635,509   | 196.6   | 555,160                   | 306,584      | 31.1    | 2,851,767                                              |
| Nevada               | 277,100                              | 239,885     | 14.3    | 5,199,123               | 2,598,924   | 524.3   | 1,351,354                 | 644,659      | 91.7    | 1,096,321                                              |
| New Hampshire        |                                      |             |         | 2,297,539               | 1,979,919   | 103.6   | 61,474                    | 53,269       | 3.3     | 1,135,399                                              |
| New Jersey           |                                      |             |         | 568,857                 | 281,163     | 7.8     | 33,344                    | 15,949       | 1.9     | 2,513,349                                              |
| New Mexico           | 282,000                              | 171,714     | 11.1    | 2,055,959               | 950,684     | 20.3    | 832,890                   | 253,805      | 106.8   | 759,819                                                |
| New York             | 1,104,224                            | 543,801     | 15.5    | 2,296,885               | 1,511,928   | 142.6   | 1,671,325                 | 1,019,086    | 48.6    | 2,804,590                                              |
| North Carolina       | 687,011                              | 343,505     | 40.5    | 19,338,073              | 9,018,916   | 321.2   | 3,258,250                 | 1,603,955    | 28.6    | 3,723,913                                              |
| North Dakota         | 93,310                               | 31,310      | 17.7    | 5,092,734               | 2,420,237   | 326.0   | 1,225,711                 | 562,705      | 70.5    | 3,943,871                                              |
| Ohio                 | 583,095                              | 231,347     | 10.6    | 1,193,800               | 1,173,290   | 212.1   | 511,762                   | 511,762      | 25.7    | 6,742,798                                              |
| Oklahoma             | 497,608                              | 261,487     | 18.3    | 8,200,197               | 4,000,785   | 88.7    | 2,055,861                 | 1,027,930    | 95.7    | 3,803,069                                              |
| Oregon               | 672,742                              | 405,039     | 28.4    | 3,331,226               | 1,727,836   | 112.5   | 1,672,447                 | 877,955      | 27.7    | 1,229,285                                              |
| Pennsylvania         | 789,470                              | 394,679     | 11.4    | 3,883,589               | 2,283,628   | 131.4   | 584,688                   | 336,801      | 49.3    | 5,002,043                                              |
| Rhode Island         | 59,100                               | 29,550      | 8.8     | 11,482,085              | 5,729,076   | 159.8   | 3,162,508                 | 1,571,653    | 1.2     | 902,980                                                |
| South Carolina       | 680,995                              | 289,200     | 36.7    | 1,444,736               | 722,368     | 17.4    | 102,270                   | 49,824       | 50.6    | 2,193,732                                              |
| South Dakota         | 142,012                              | 89,192      | 14.8    | 4,942,516               | 2,049,458   | 181.6   | 814,383                   | 324,235      | 116.9   | 3,601,680                                              |
| Tennessee            | 451,598                              | 225,799     | 19.6    | 1,821,814               | 1,011,848   | 68.0    | 1,228,818                 | 679,770      | 14.6    | 5,254,798                                              |
| Texas                | 2,211,809                            | 1,105,365   | 178.0   | 11,705,284              | 852,642     | 94.5    | 365,580                   | 182,790      | 59.9    | 8,747,209                                              |
| Utah                 | 101,208                              | 72,462      | 6.2     | 11,597,498              | 5,778,831   | 688.0   | 1,340,359                 | 669,893      | 25.4    | 1,533,249                                              |
| Vermont              | 235,200                              | 117,600     | 6.0     | 1,132,450               | 804,656     | 107.0   | 252,670                   | 176,290      | 14.2    | 312,273                                                |
| Virginia             | 360,120                              | 150,060     | 17.7    | 1,110,579               | 498,414     | 31.2    | 666,944                   | 278,402      | 17.9    | 2,911,523                                              |
| Washington           | 604,380                              | 317,700     | 46.4    | 3,220,072               | 1,551,838   | 102.7   | 399,501                   | 199,751      | 26.1    | 1,397,037                                              |
| West Virginia        | 330,204                              | 165,102     | 11.6    | 2,002,151               | 1,048,971   | 32.3    | 1,264,488                 | 661,598      | 21.6    | 2,457,878                                              |
| Wisconsin            | 1,083,758                            | 531,321     | 30.9    | 1,399,472               | 699,384     | 33.9    | 717,264                   | 354,227      | 71.1    | 1,968,486                                              |
| Wyoming              | 255,537                              | 157,378     | 29.9    | 7,352,782               | 3,367,615   | 213.8   | 2,168,201                 | 995,400      | 31.4    | 534,358                                                |
| District of Columbia |                                      |             |         | 2,624,746               | 1,603,884   | 295.8   | 414,560                   | 255,800      |         | 1,227,500                                              |
| Hawaii               |                                      |             |         |                         |             |         |                           |              |         | 625,000                                                |
| Puerto Rico          |                                      |             |         | 616,749                 | 301,733     | 12.8    | 371,350                   | 182,080      | 5.4     | 130,406,952                                            |
| TOTALS               | 24,965,174                           | 13,056,481  | 1,105.9 | 201,913,817             | 100,698,528 | 7,199.5 | 67,335,800                | 33,690,163   | 2,389.6 |                                                        |

U. S. GOVERNMENT PRINTING OFFICE 8487

## CURRENT STATUS OF UNITED STATES WORKS PROGRAM HIGHWAY PROJECTS

(AS PROVIDED BY THE EMERGENCY RELIEF APPROPRIATION ACT OF 1935)

AS OF JULY 31, 1937

| STATE                | APPORTIONMENT        |                     | COMPLETED |                      |                     | UNDER CONSTRUCTION |                      |                     | APPROVED FOR CONSTRUCTION |           |  | BALANCE OF FUNDS AVAILABLE FOR NEW PROJECTS |
|----------------------|----------------------|---------------------|-----------|----------------------|---------------------|--------------------|----------------------|---------------------|---------------------------|-----------|--|---------------------------------------------|
|                      | Estimated Total Cost | Works Program Funds | Miles     | Estimated Total Cost | Works Program Funds | Miles              | Estimated Total Cost | Works Program Funds | Miles                     |           |  |                                             |
| Alabama              | \$ 4,151,115         | \$ 3,364,997        | 111.5     | \$ 690,450           | \$ 690,450          | 26.8               | \$ 80,572            | \$ 80,572           | 6.5                       | \$ 50,238 |  |                                             |
| Arizona              | 2,569,841            | 2,480,476           | 188.6     | 144,128              | 73,622              | 7.3                |                      |                     |                           | 75,743    |  |                                             |
| Arkansas             | 3,352,061            | 2,909,704           | 323.5     | 401,979              | 400,462             | 36.8               |                      |                     |                           | 41,694    |  |                                             |
| California           | 7,747,928            | 6,588,253           | 242.8     | 1,544,552            | 1,343,580           | 21.2               |                      |                     |                           | 22,357    |  |                                             |
| Colorado             | 3,325,263            | 2,279,500           | 101.0     | 89,598               | 89,596              | 6.0                |                      |                     |                           | 1,017,947 |  |                                             |
| Connecticut          | 1,418,709            | 589,124             | 4.7       | 542,320              | 525,090             | 15.7               |                      |                     |                           | 50,690    |  |                                             |
| Delaware             | 900,310              | 605,917             | 48.9      | 274,312              | 274,312             | 17.9               |                      |                     |                           | 42,108    |  |                                             |
| Florida              | 2,597,144            | 2,283,306           | 83.4      | 307,321              | 307,321             | 15.7               |                      |                     |                           | 40,343    |  |                                             |
| Georgia              | 4,368,967            | 3,925,153           | 61.5      | 1,418,207            | 1,418,207           | 82.1               |                      |                     |                           | 951,646   |  |                                             |
| Idaho                | 2,222,747            | 2,245,149           | 185.6     | 48,669               | 48,669              | 3.3                |                      |                     |                           | 22,169    |  |                                             |
| Illinois             | 8,694,009            | 7,872,669           | 445.1     | 852,436              | 852,436             | 31.7               |                      |                     |                           | 71,281    |  |                                             |
| Indiana              | 4,941,255            | 3,673,534           | 158.2     | 1,331,677            | 1,273,425           | 80.2               |                      |                     |                           | 6,745     |  |                                             |
| Iowa                 | 4,991,664            | 4,269,678           | 147.7     | 660,193              | 651,360             | 30.1               |                      |                     |                           | 1,955     |  |                                             |
| Kansas               | 4,994,975            | 4,341,256           | 147.4     | 666,873              | 624,701             | 28.8               |                      |                     |                           | 27,586    |  |                                             |
| Kentucky             | 3,126,271            | 3,213,645           | 343.9     | 503,380              | 503,380             | 12.3               |                      |                     |                           | 62,193    |  |                                             |
| Louisiana            | 2,890,429            | 1,997,149           | 130.0     | 1,099,363            | 1,005,670           | 37.7               |                      |                     |                           | 31,912    |  |                                             |
| Maine                | 1,676,799            | 1,409,956           | 66.3      | 252,617              | 252,617             | 8.8                |                      |                     |                           | 74,774    |  |                                             |
| Maryland             | 1,750,718            | 1,475,773           | 17.6      | 747,571              | 747,571             | 17.4               |                      |                     |                           | 28,514    |  |                                             |
| Massachusetts        | 3,262,685            | 3,914,467           | 4.0       | 2,609,120            | 2,218,350           | 14.4               |                      |                     |                           | 159,302   |  |                                             |
| Michigan             | 6,301,414            | 6,471,719           | 287.2     | 297,637              | 296,521             | 4.8                |                      |                     |                           | 8         |  |                                             |
| Minnesota            | 5,277,145            | 5,940,974           | 869.2     | 676,607              | 431,309             | 33.3               |                      |                     |                           | 39,582    |  |                                             |
| Mississippi          | 3,457,592            | 2,467,736           | 176.1     | 891,215              | 896,175             | 58.6               |                      |                     |                           | 42,575    |  |                                             |
| Missouri             | 6,012,652            | 4,875,442           | 766.7     | 1,226,537            | 1,061,495           | 11.0               |                      |                     |                           | 23,936    |  |                                             |
| Montana              | 3,676,416            | 3,432,472           | 195.3     | 276,530              | 237,591             | 9.9                |                      |                     |                           | 34,390    |  |                                             |
| Nebraska             | 3,670,739            | 3,119,172           | 389.6     | 616,026              | 616,023             | 39.7               |                      |                     |                           | 8,462     |  |                                             |
| Nevada               | 2,243,074            | 2,232,578           | 109.9     | 86,696               | 71,696              | 3.3                |                      |                     |                           | 221,856   |  |                                             |
| New Hampshire        | 945,225              | 783,152             | 34.4      | 112,951              | 112,166             | 1.9                |                      |                     |                           | 11,731    |  |                                             |
| New Jersey           | 3,129,809            | 1,063,016           | 16.8      | 1,992,109            | 1,978,994           | 17.3               |                      |                     |                           | 2,857     |  |                                             |
| New Mexico           | 2,871,397            | 2,346,744           | 182.9     | 406,063              | 406,063             | 20.8               |                      |                     |                           | 26,970    |  |                                             |
| New York             | 11,046,377           | 10,292,702          | 157.6     | 669,044              | 669,044             | 12.6               |                      |                     |                           | 27,445    |  |                                             |
| North Carolina       | 4,720,173            | 3,307,162           | 220.7     | 1,434,870            | 1,397,070           | 70.0               |                      |                     |                           | 58,209    |  |                                             |
| North Dakota         | 2,667,245            | 2,309,727           | 346.1     | 237,825              | 237,769             | 17.3               |                      |                     |                           | 491,215   |  |                                             |
| Ohio                 | 7,670,815            | 4,074,665           | 177.6     | 3,446,677            | 3,406,242           | 112.5              |                      |                     |                           | 9,411     |  |                                             |
| Oklahoma             | 4,580,670            | 4,095,057           | 365.6     | 1,129,226            | 900,009             | 15.0               |                      |                     |                           | 14,433    |  |                                             |
| Oregon               | 3,038,642            | 2,147,260           | 155.6     | 5,735,320            | 5,358,959           | 8.9                |                      |                     |                           | 35,661    |  |                                             |
| Pennsylvania         | 9,347,797            | 2,421,275           | 127.2     | 2,374,057            | 2,240               | 180.9              |                      |                     |                           | 17,662    |  |                                             |
| Rhode Island         | 989,808              | 1,109,360           | 18.8      | 2,240                | 2,240               | 3.3                |                      |                     |                           | 12,615    |  |                                             |
| South Carolina       | 2,702,012            | 1,949,444           | 213.2     | 870,510              | 803,007             | 36.3               |                      |                     |                           | 271,648   |  |                                             |
| South Dakota         | 2,576,454            | 2,150,415           | 410.5     | 748,557              | 748,557             | 22.3               |                      |                     |                           | 72        |  |                                             |
| Tennessee            | 4,192,460            | 2,646,689           | 105.1     | 1,294,797            | 1,294,797           | 22.3               |                      |                     |                           | 33,995    |  |                                             |
| Texas                | 11,989,350           | 12,437,179          | 1,097.6   | 414,253              | 353,745             | 42.1               |                      |                     |                           | 15,397    |  |                                             |
| Utah                 | 2,067,154            | 1,809,358           | 180.1     | 414,447              | 362,741             | 24.7               |                      |                     |                           | 151,117   |  |                                             |
| Vermont              | 924,306              | 1,014,375           | 21.9      | 53,872               | 40,740              | 1.3                |                      |                     |                           | 25,592    |  |                                             |
| Virginia             | 3,652,667            | 3,230,800           | 989.2     | 250,441              | 247,071             | 35.2               |                      |                     |                           | 4,858     |  |                                             |
| Washington           | 3,026,161            | 3,162,187           | 163.2     | 234,414              | 185,272             | 1.1                |                      |                     |                           | 161,043   |  |                                             |
| West Virginia        | 2,231,412            | 977,979             | 43.6      | 1,368,548            | 1,232,649           | 51.5               |                      |                     |                           | 30,836    |  |                                             |
| Wisconsin            | 4,823,684            | 5,213,259           | 337.7     | 133,855              | 124,000             | 6.1                |                      |                     |                           | 4,131     |  |                                             |
| Wyoming              | 2,219,155            | 2,067,737           | 139.9     | 153,601              | 153,601             | 12.5               |                      |                     |                           | 8,248     |  |                                             |
| District of Columbia | 949,496              | 949,496             | 8.8       | 334,873              | 303,597             | 8.5                |                      |                     |                           | 2,937     |  |                                             |
| Hawaii               | 926,033              | 628,269             | 8.9       |                      |                     |                    |                      |                     |                           |           |  |                                             |
| TOTALS               | 195,000,000          | 153,749,822         | 11,636.7  | 46,181,083           | 37,723,946          | 1,357.7            | 7,572,365            | 6,266,635           | 294.0                     | 4,569,459 |  |                                             |

## *PUBLICATIONS of the BUREAU OF PUBLIC ROADS*

---

Any of the following publications may be purchased from the Superintendent of Documents, Government Printing Office, Washington, D. C. As his office is not connected with the Department and as the Department does not sell publications, please send no remittance to the United States Department of Agriculture.

### *ANNUAL REPORTS*

- Report of the Chief of the Bureau of Public Roads, 1924. 5 cents.  
Report of the Chief of the Bureau of Public Roads, 1927. 5 cents.  
Report of the Chief of the Bureau of Public Roads, 1928. 5 cents.  
Report of the Chief of the Bureau of Public Roads, 1929. 10 cents.  
Report of the Chief of the Bureau of Public Roads, 1931. 10 cents.  
Report of the Chief of the Bureau of Public Roads, 1933. 5 cents.  
Report of the Chief of the Bureau of Public Roads, 1934. 10 cents.  
Report of the Chief of the Bureau of Public Roads, 1935. 5 cents.  
Report of the Chief of the Bureau of Public Roads, 1936. 10 cents.

### *DEPARTMENT BULLETINS*

- No. 583D. Reports on Experimental Convict Road Camp, Fulton County, Ga. 25 cents.  
No. 1279D. Rural Highway Mileage, Income, and Expenditures, 1921 and 1922. 15 cents.  
No. 1486D. Highway Bridge Location. 15 cents.

### *TECHNICAL BULLETINS*

- No. 55T. Highway Bridge Surveys. 20 cents.  
No. 265T. Electrical Equipment on Movable Bridges. 35 cents.

### *MISCELLANEOUS PUBLICATIONS*

- No. 76MP. The Results of Physical Tests of Road-Building Rock. 25 cents.  
No. 191MP. Roadside Improvement. 10 cents.  
No. 272MP. Construction of Private Driveways. 10 cents.  
No. 279MP. Bibliography on Highway Lighting. 5 cents.  
The Taxation of Motor Vehicles in 1932. 35 cents.

Federal Legislation and Rules and Regulations Relating to Highway Construction. 15 cents.

An Economic and Statistical Analysis of Highway-Construction Expenditures. 15 cents.

Highway Bond Calculations. 10 cents.

---

Single copies of the following publications may be obtained from the Bureau of Public Roads upon request. They cannot be purchased from the Superintendent of Documents.

### *SEPARATE REPRINT FROM THE YEARBOOK*

No. 1036Y. Road Work on Farm Outlets Needs Skill and Right Equipment.

### *TRANSPORTATION SURVEY REPORTS*

Report of a Survey of Transportation on the State Highway System of Ohio (1927).

Report of a Survey of Transportation on the State Highways of Vermont (1927).

Report of a Survey of Transportation on the State Highways of New Hampshire (1927).

Report of a Plan of Highway Improvement in the Regional Area of Cleveland, Ohio (1928).

Report of a Survey of Transportation on the State Highways of Pennsylvania (1928).

Report of a Survey of Traffic on the Federal-Aid Highway Systems of Eleven Western States (1930).

### *UNIFORM VEHICLE CODE*

Act I.—Uniform Motor Vehicle Administration, Registration, Certificate of Title, and Antitheft Act.

Act II.—Uniform Motor Vehicle Operators' and Chauffeurs' License Act.

Act III.—Uniform Motor Vehicle Civil Liability Act.

Act IV.—Uniform Motor Vehicle Safety Responsibility Act.

Act V.—Uniform Act Regulating Traffic on Highways.

Model Traffic Ordinances.

---

A complete list of the publications of the Bureau of Public Roads, classified according to subject and including the more important articles in *PUBLIC ROADS*, may be obtained upon request addressed to the U. S. Bureau of Public Roads, Willard Building, Washington, D. C.

---



# CURRENT STATUS OF UNITED STATES WORKS PROGRAM GRADE CROSSING PROJECTS

(AS PROVIDED BY THE EMERGENCY RELIEF APPROPRIATION ACT OF 1935)

AS OF JULY 31, 1937

| STATE             | APPORTIONMENT | COMPLETED            |                     |                                                                                | UNDER CONSTRUCTION   |                     |                                                                                | APPROVED FOR CONSTRUCTION |                     |                                                                                | BALANCE OF FUNDS AVAILABLE FOR PROJECTS |
|-------------------|---------------|----------------------|---------------------|--------------------------------------------------------------------------------|----------------------|---------------------|--------------------------------------------------------------------------------|---------------------------|---------------------|--------------------------------------------------------------------------------|-----------------------------------------|
|                   |               | Estimated Total Cost | Works Program Funds | NUMBER<br>Grade Crossing Eliminated<br>by this project<br>or other<br>projects | Estimated Total Cost | Works Program Funds | NUMBER<br>Grade Crossing Eliminated<br>by this project<br>or other<br>projects | Estimated Total Cost      | Works Program Funds | NUMBER<br>Grade Crossing Eliminated<br>by this project<br>or other<br>projects |                                         |
| Alabama           | \$4,034,617   | \$2,905,597          | \$2,905,333         | 40                                                                             | \$933,721            | \$933,721           | 8                                                                              | \$132,100                 | \$132,100           | 2                                                                              | \$53,462                                |
| Arizona           | 1,256,099     | 1,113,686            | 1,085,874           | 13                                                                             | 190,885              | 153,783             | 2                                                                              | 207,825                   | 207,555             | 1                                                                              | 16,402                                  |
| Arkansas          | 3,274,060     | 2,028,023            | 2,022,344           | 40                                                                             | 1,309,967            | 1,308,117           | 15                                                                             | 10,000                    | 10,000              | 30                                                                             | 36,045                                  |
| California        | 7,486,362     | 6,297,264            | 6,062,841           | 35                                                                             | 1,416,095            | 1,413,189           | 12                                                                             | 432,980                   | 364,066             | 5                                                                              | 332                                     |
| Colorado          | 2,631,567     | 1,482,761            | 1,429,513           | 19                                                                             | 895,499              | 825,498             | 8                                                                              | 719,920                   | 700,735             | 4                                                                              | 12,490                                  |
| Connecticut       | 1,712,684     | 141,009              | 141,009             | 1                                                                              | 845,081              | 823,720             | 5                                                                              |                           |                     |                                                                                | 47,220                                  |
| Delaware          | 416,239       | 130,000              | 130,000             | 1                                                                              | 277,993              | 277,993             | 2                                                                              |                           |                     |                                                                                | 10,246                                  |
| Florida           | 2,827,883     | 1,884,508            | 1,881,759           | 21                                                                             | 645,849              | 645,849             | 6                                                                              | 966,910                   | 966,910             | 21                                                                             | 303,163                                 |
| Georgia           | 4,895,949     | 1,175,057            | 1,175,057           | 3                                                                              | 1,195,341            | 1,195,341           | 22                                                                             | 63,913                    | 63,913              | 3                                                                              | 2,662,093                               |
| Idaho             | 1,674,479     | 1,231,709            | 1,225,244           | 19                                                                             | 362,328              | 362,160             | 30                                                                             |                           |                     |                                                                                | 23,162                                  |
| Illinois          | 6,277,687     | 6,277,687            | 6,256,962           | 53                                                                             | 3,858,805            | 3,858,805           | 20                                                                             |                           |                     |                                                                                | 191,117                                 |
| Indiana           | 5,111,096     | 2,391,622            | 2,243,232           | 25                                                                             | 2,846,170            | 2,846,170           | 17                                                                             |                           |                     |                                                                                | 31,512                                  |
| Iowa              | 5,600,679     | 3,449,125            | 3,349,076           | 77                                                                             | 2,176,654            | 2,173,501           | 30                                                                             | 86,572                    | 74,590              | 1                                                                              | 21,841                                  |
| Kansas            | 5,246,258     | 3,110,156            | 3,105,342           | 14                                                                             | 2,176,281            | 2,104,036           | 10                                                                             | 812,339                   | 15,000              | 2                                                                              | 32,864                                  |
| Kentucky          | 3,672,387     | 1,084,167            | 1,074,334           | 3                                                                              | 2,056,174            | 1,766,442           | 10                                                                             | 1,094,512                 | 892,484             | 9                                                                              | 196,429                                 |
| Louisiana         | 3,213,467     | 935,657              | 935,657             | 10                                                                             | 1,188,906            | 1,188,897           | 12                                                                             | 71,740                    | 24,068              | 1                                                                              | 24,288                                  |
| Maine             | 1,422,461     | 955,109              | 953,088             | 18                                                                             | 495,417              | 495,417             | 2                                                                              | 597,632                   | 525,163             | 3                                                                              | 319,790                                 |
| Maryland          | 2,061,751     | 405,070              | 405,070             | 3                                                                              | 807,729              | 807,729             | 4                                                                              | 257,241                   | 257,241             | 1                                                                              | 216,060                                 |
| Massachusetts     | 4,210,633     | 1,414,106            | 1,414,021           | 12                                                                             | 2,323,511            | 2,323,511           | 14                                                                             | 43,500                    | 43,500              | 1                                                                              | 3,382                                   |
| Michigan          | 6,769,197     | 4,834,492            | 4,723,487           | 40                                                                             | 2,065,327            | 1,994,898           | 4                                                                              | 57,010                    | 57,010              | 11                                                                             | 242                                     |
| Minnesota         | 5,395,441     | 3,936,837            | 3,863,055           | 73                                                                             | 1,501,132            | 1,475,134           | 12                                                                             | 36,200                    | 36,200              | 13                                                                             | 491,650                                 |
| Mississippi       | 3,241,475     | 1,417,521            | 1,417,356           | 37                                                                             | 1,294,268            | 1,294,268           | 19                                                                             | 1,650                     | 1,650               | 1                                                                              | 14,283                                  |
| Missouri          | 6,142,153     | 1,128,770            | 1,113,281           | 17                                                                             | 5,193,890            | 5,012,959           | 32                                                                             |                           |                     |                                                                                | 153                                     |
| Montana           | 2,722,327     | 2,657,848            | 2,536,243           | 37                                                                             | 239,610              | 185,931             | 1                                                                              | 221,535                   | 196,497             | 5                                                                              | 10,197                                  |
| Nebraska          | 3,556,441     | 2,115,893            | 2,086,102           | 69                                                                             | 1,263,645            | 1,263,645           | 13                                                                             | 3,630                     | 3,630               | 6                                                                              | 5,904                                   |
| Nevada            | 887,260       | 690,077              | 684,294             | 7                                                                              | 211,658              | 193,432             | 4                                                                              | 56,412                    | 56,412              | 1                                                                              |                                         |
| New Hampshire     | 822,184       | 476,747              | 476,747             | 5                                                                              | 313,519              | 313,519             | 4                                                                              | 52,505                    | 52,505              | 3                                                                              |                                         |
| New Jersey        | 3,983,826     | 959,126              | 959,126             | 8                                                                              | 2,395,029            | 2,343,944           | 13                                                                             | 680,516                   | 680,516             | 3                                                                              |                                         |
| New Mexico        | 1,725,286     | 1,572,408            | 1,568,490           | 16                                                                             | 40,227               | 40,227              | 23                                                                             | 11,202                    | 11,202              | 1                                                                              | 5,167                                   |
| New York          | 13,577,189    | 6,031,240            | 5,971,216           | 22                                                                             | 7,546,790            | 7,334,290           | 23                                                                             | 94,000                    | 94,000              | 12                                                                             | 177,683                                 |
| North Carolina    | 4,823,958     | 2,651,803            | 2,651,228           | 34                                                                             | 1,325,407            | 1,305,856           | 14                                                                             | 617,150                   | 617,150             | 12                                                                             | 249,724                                 |
| North Dakota      | 3,207,473     | 1,898,522            | 1,894,748           | 35                                                                             | 1,312,725            | 1,312,725           | 16                                                                             |                           |                     |                                                                                |                                         |
| Ohio              | 8,433,897     | 1,385,994            | 1,308,493           | 7                                                                              | 5,979,507            | 5,605,480           | 38                                                                             | 1,214,000                 | 1,129,000           | 12                                                                             | 396,925                                 |
| Oklahoma          | 5,004,711     | 3,061,896            | 3,054,355           | 50                                                                             | 958,256              | 958,256             | 9                                                                              | 1,107,190                 | 974,090             | 6                                                                              | 18,010                                  |
| Oregon            | 2,334,204     | 1,786,420            | 1,780,448           | 13                                                                             | 669,664              | 669,664             | 4                                                                              |                           |                     |                                                                                | 5,693                                   |
| Pennsylvania      | 11,483,613    | 3,433,545            | 3,078,062           | 43                                                                             | 8,209,274            | 7,665,841           | 37                                                                             | 473,686                   | 463,301             | 10                                                                             | 256,409                                 |
| Rhode Island      | 699,691       | 649,511              | 648,445             | 4                                                                              | 44,314               | 44,314              | 1                                                                              |                           |                     |                                                                                | 6,932                                   |
| South Carolina    | 3,095,596     | 1,258,233            | 1,246,814           | 25                                                                             | 1,067,952            | 1,060,591           | 18                                                                             | 372,582                   | 350,742             | 1                                                                              | 401,839                                 |
| South Dakota      | 3,249,086     | 1,484,346            | 1,483,749           | 33                                                                             | 1,537,169            | 1,537,169           | 26                                                                             | 281,170                   | 222,213             | 13                                                                             | 5,356                                   |
| Tennessee         | 3,903,979     | 809,323              | 801,288             | 16                                                                             | 2,588,590            | 2,588,590           | 30                                                                             | 133,610                   | 133,610             | 1                                                                              | 380,531                                 |
| Texas             | 10,855,982    | 8,149,964            | 8,138,660           | 110                                                                            | 2,046,450            | 2,046,447           | 20                                                                             | 258,502                   | 258,502             | 89                                                                             | 412,372                                 |
| Utah              | 1,230,763     | 568,184              | 568,184             | 7                                                                              | 649,540              | 649,540             | 10                                                                             |                           |                     |                                                                                | 14,444                                  |
| Vermont           | 729,857       | 504,414              | 538,492             | 7                                                                              | 1,204,133            | 1,187,274           | 3                                                                              |                           |                     |                                                                                | 4,090                                   |
| Virginia          | 3,775,287     | 2,276,717            | 2,176,847           | 39                                                                             | 1,035,188            | 1,028,563           | 8                                                                              | 945,970                   | 543,956             | 3                                                                              | 24,920                                  |
| Washington        | 3,095,041     | 2,469,207            | 2,434,460           | 21                                                                             | 645,949              | 645,949             | 2                                                                              | 4,562                     | 4,562               | 2                                                                              | 10,476                                  |
| West Virginia     | 2,677,937     | 79,464               | 79,464              | 11                                                                             | 1,859,691            | 1,857,723           | 18                                                                             | 664,262                   | 664,262             | 7                                                                              | 16,498                                  |
| Wyoming           | 5,022,683     | 3,600,892            | 3,566,155           | 33                                                                             | 1,436,581            | 1,436,581           | 4                                                                              | 29,367                    | 29,367              | 1                                                                              | 623                                     |
| Dist. of Columbia | 1,460,841     | 865,281              | 865,172             | 9                                                                              | 695,169              | 695,169             | 5                                                                              |                           |                     |                                                                                |                                         |
| Hawaii            | 453,703       | 170,404              | 170,389             | 2                                                                              | 351,976              | 283,314             | 3                                                                              |                           |                     |                                                                                |                                         |
| TOTALS            | 196,000,000   | 100,581,106          | 98,436,834          | 1275                                                                           | 281                  | 267                 | 597                                                                            | 12,621,817                | 11,581,857          | 133                                                                            | 7,176,204                               |